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*The Magazine of the Northeast Sustainable Energy Association*

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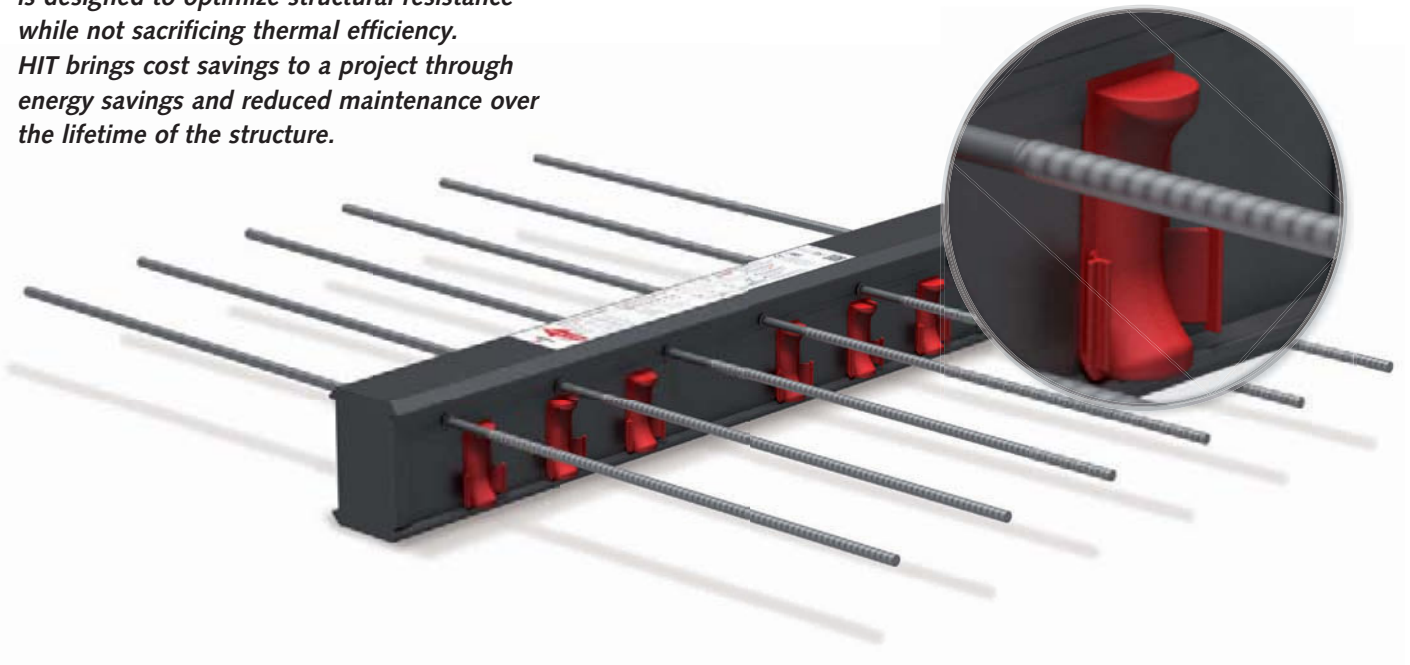


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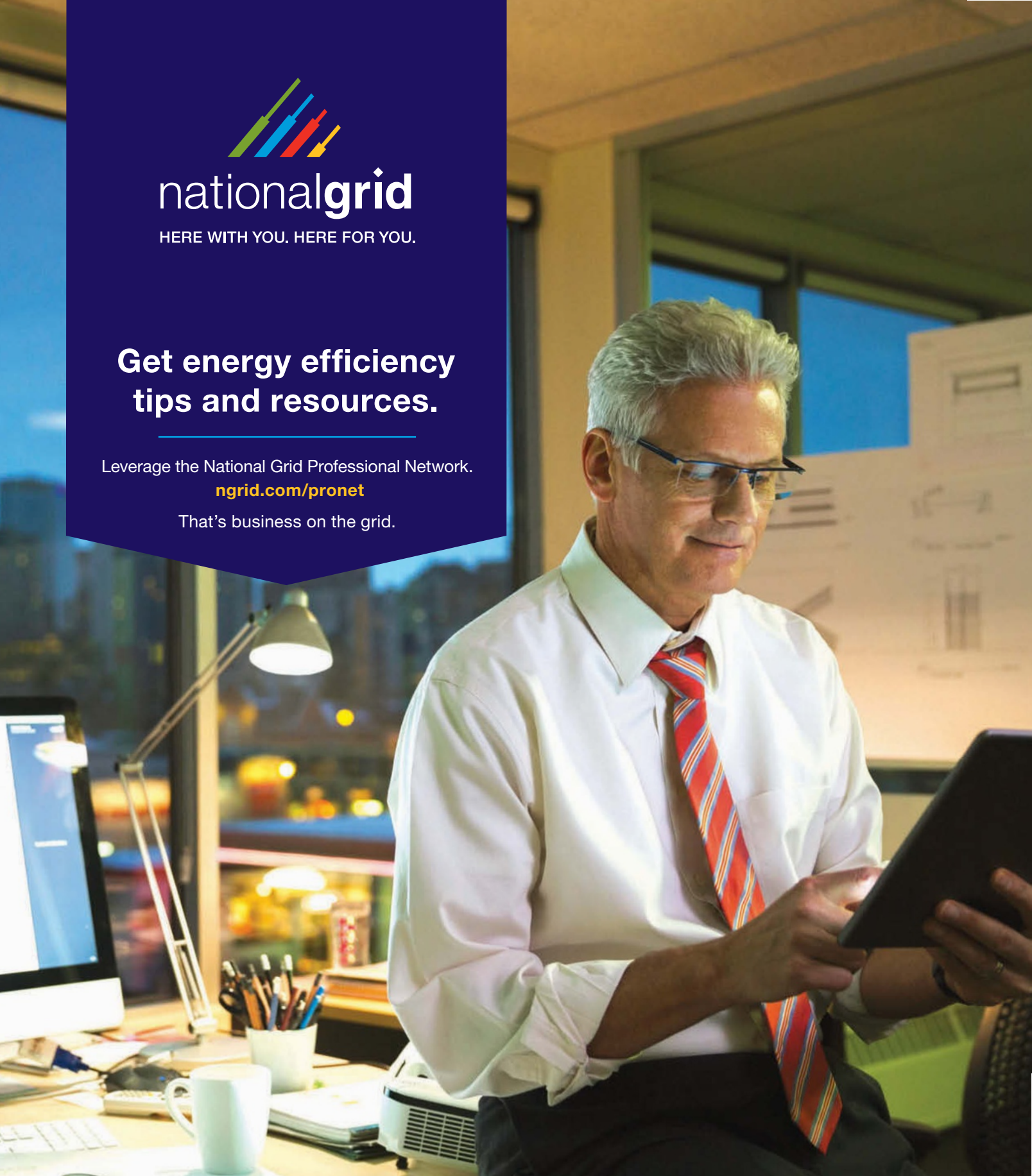
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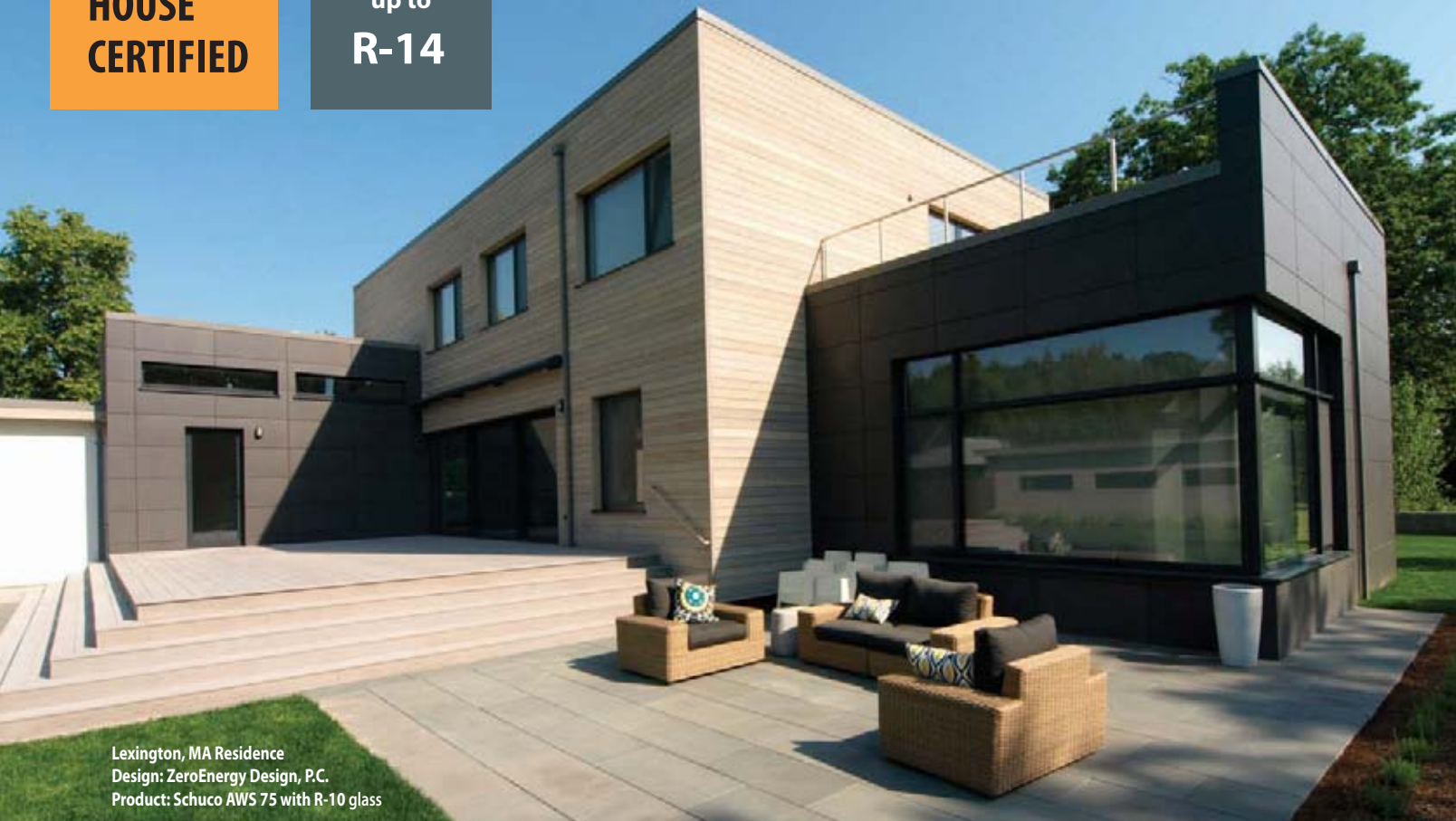
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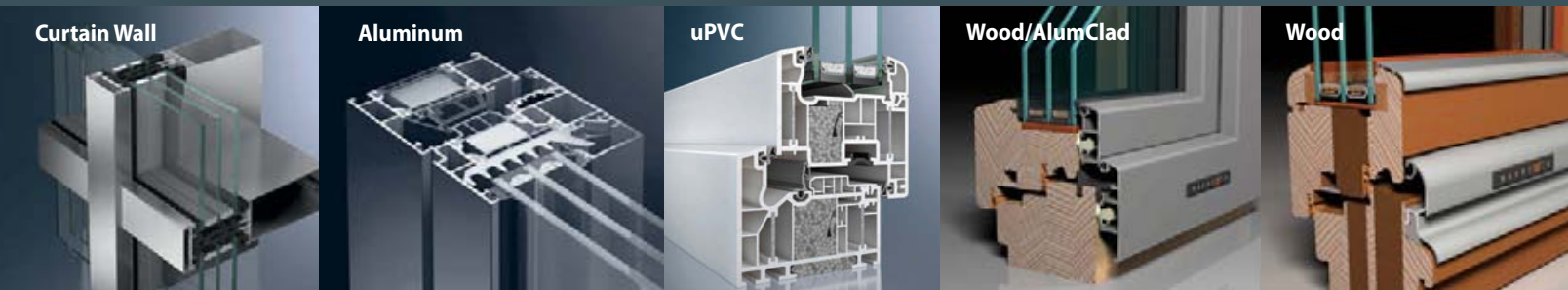
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## ABOUT NESEA AND BUILDINGENERGY MAGAZINE

The Northeast Sustainable Energy Association (NESEA) is the region's leading community of professionals working in sustainable energy, whole systems thinking and clean technology. We advance the adoption of sustainable energy practices in the built environment by cultivating a community where practitioners share, collaborate and learn. The content in this magazine is selected by an Editorial Committee of NESEA members, and most articles are peer reviewed. To learn more about NESEA member benefits, contact Membership Manager Katie Schendel at [kschendel@nesea.org](mailto:kschendel@nesea.org). To learn more about writing for the magazine, serving as a peer reviewer or on the Editorial Committee contact Florence MacGregor at [fmacgregor@nesea.org](mailto:fmacgregor@nesea.org).



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# A STRATEGIC PLAN FOR EMERGING PROFESSIONALS



BY JENNIFER MARRAPESE

PHOTO CREDIT:  
MATTHEW CAVANAUGH

**F**or as long as I have been on board as NESEA's Executive Director, we've been talking about diversifying our membership by inviting the next generation into the fold. (In fact, we've been talking about it for so long that the next generation might now actually be a different generation than the "next generation" of eight years ago!)

We've made steady progress over the years. We've recruited emerging professionals to serve on our conference planning teams, mentored by longstanding NESEA members. We have offered conference scholarships to emerging professionals and students (more than 60 over the past year), and have engaged NESEA members in that process as donors and scholarship sponsors. Two emerging professionals have participated in career-changing trips to Scandinavia to learn about building science and resiliency efforts and to build their own professional networks. We have hosted career forums at our conferences. But our efforts have always been limited to what we could do within existing budgets and staffing. We never had the bandwidth to make emerging professionals a real priority.

All that changed when the board adopted our new strategic plan. Goal 3 of the plan provides, "With an initial focus on Emerging Professionals, broaden the demographic diversity of NESEA membership to better reflect the constituency NESEA serves." This goal invites us to think about how emerging professionals and students fit into all of our programs, and a mandate to find ways to engage them.

The NESEA staff has embraced the clarity of this new goal. We have charged Florence MacGregor with managing our Emerging Professionals program, securing financial resources and establishing and tracking metrics for how we engage students and those who are newly entering their sustainable energy careers. Here are a few of the things NESEA has in the works:


- A new membership level for Emerging Professionals. This new level allows us to more readily track when and how EPs are engaging with NESEA, and allows them to enjoy the benefits of membership at a slightly reduced rate.

- Focus groups to learn more from EPs about the challenges they face in their careers, and how NESEA might help.
- An EP component in our BuildingEnergy NYC Conference. For the first time this year, we will offer a Career Forum for Emerging Professionals in NYC to complement what we've done in Boston for many years.
- A revitalized jobs board, <http://nesea.org/jobs-board>, on which any NESEA business member can post job vacancies. This jobs board, one of the most heavily trafficked pages on nesea.org, also contains links to the job boards of all of our business members – a one-stop shop for all NESEA job seekers, not just EPs.

All these efforts take resources. Fortunately, a few NESEA members have stepped up to support our new Emerging Professionals program. Michael Gimbere, who administers the Pat Cooke Fund, has pledged \$5,000 in seed money for this new program. Lifetime NESEA member Max Horn has matched that \$5,000. And 55 members of our community helped us raise more than \$13,000 on Valley Gives Day to support the Kate Goldstein Fund for Emerging Professionals. We thank them for paving the way to make this new program possible. We invite you to support our efforts too.

As always, I look forward to keeping you apprised of our progress. 🌱

## ABOUT THE AUTHOR

**Jennifer Marrapese** takes care of the big picture: How do we make NESEA's multidisciplinary network of practitioners bigger and better? She works with the board of directors and members to establish NESEA's strategy and to ensure that the board and staff have the resources to execute it. Jennifer is known for her strategic sense and for her ability to forge strong partnerships among staff, NESEA members and other collaborators. She earned her BA in Journalism from the University of Wisconsin, her JD from the University of California, Berkeley, and her MA in Organizational Management and Development from Fielding University. She lives as close to net zero as possible in her deep energy retrofitted ranch, despite having two teenage daughters and a swimming pool.  LIFETIME MEMBER

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# TAKING FLIGHT INTO NEW TERRITORY



BY PHIL KAPLAN

**D**ear NESEA Members,  
OK, I'm not an old timer, but I'm no spring chicken either: I've been an active NESEA member and BuildingEnergy Conference goer for 11 years, and a Board Member for 5. I've seen the best of Rosenbaum and the worst of Lstiburek. I've seen amazing Board Members come and go. And I've seen a most excellent Executive Director over the last several years really find her groove. And this year feels different.

I've never seen a staff like this one: engaged, affable, skilled and invested.

I've never seen a Board like this one: enthusiastic, collaborative, creative, diverse and all in.

The new Strategic Plan is a testament to the current strength of the organization. And the next steps are its execution, and making sure all of this excitement touches NESEA members in a very palpable way. You ready?

To start, we are tightening up the BuildingEnergy Boston Conference + Trade Show and giving you more of what you've asked for: NESEA Night included in your ticket, sessions filmed, food for exhibitors. We've listened.

Also, bye-bye, Seaport...hello, Westin Hotel! This is a serious venue upgrade, and although it involved some creativity, lots of hard work by NESEA staff and a little luck, we get to be in our new digs in '18. We'll get a more concentrated, higher-quality trade show floor, fantastic session rooms and a great place to stay all without even needing to open the door and let all that sweet, sweet energy flow out.

We are less BuildingEnergy Boston-centric than ever before. Our current mix has made room for other relatively new programs to expand each year, including BuildingEnergy NYC, and our Bottom Lines, Pro Tours and Emerging Professionals programs. This means more people, in more regions, in wider swaths of each active profession are getting involved in furthering our mission of advancing the adoption of sustainable energy practices in the built environment.

And in order to make the significant impact we all dream about, we are aiming for the true financial stability that a mature organization deserves. This year, we will launch NESEA's first Capacity Campaign. This ambitious, three year initiative will be led by Board Development Chair and cheerleader extraordinaire, South Mountain Company's Rob Meyers and the Development Committee. The organization you know and love is taking flight into new territory at a time that's never needed us more. Let's do this! 🚀

## ABOUT THE AUTHOR

*Phil Kaplan's firm Kaplan Thompson Architects has received numerous accolades in the world of design and high-performance building. The firm's motto, "Beautiful Sustainable Attainable," reinforces their commitment to creating vibrant, healthy and durable buildings for all. His other venture, BrightBuilt Home, aims to provide more affordable, modular net-zero homes throughout the Northeast and Mid-Atlantic. Phil's 'edutainment' podcast, Green Architects' Lounge, is a topical blog on the popular website, Green Building Advisor.*



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# WHAT IS STRATEGIC ELECTRIFICATION?

SIMPLY PUT, IT'S AN ENERGY TRANSFORMATION



BY DAVE LIS AND  
LISA CASCIO

PEER REVIEWED BY  
CHRIS POWICKI

Let's go on a journey. For a moment, let's jump into our Back to the Future-style DeLorean time machine to visit a future where energy generation is as clean as possible, deep efficiency and renewables are widely valued and communities across the country are harnessing their own power to reach (and maybe even surpass) their carbon reduction goals. In this future-looking view, we see a country where most, if not all, energy comes from non-fossil fuel generation.

This hi-tech world isn't too far off in the future. Many jurisdictions in the country – including several states within the northeast – have adopted aggressive greenhouse gas (GHG) emission reduction goals. Several are already making good progress in meeting those goals. In fact, in the six New England states, emissions from energy use in 2015 were 19 percent less than in 2001. These states are committed to mitigating the impacts of climate change.

However, in order to reach reductions to the tune of 80 percent below 2001 levels, deep decarbonization is necessary. The traditional methods of increased energy efficiency and decarbonized electric grid aren't enough. We need to integrate a third strategy – powering key end uses with low-carbon electricity instead of fossil fuels (Figure 1).

This is an area of great opportunity. A small number of end uses in buildings, industry and transportation sectors account for 85 percent of direct fossil fuel use in New York and New England.<sup>1</sup> If we identify and focus on those end uses, we can carefully plan and make informed decisions about how and when to move them to electricity. Enter strategic electrification.

## WHAT DOES STRATEGIC ELECTRIFICATION MEAN?

Strategic electrification, or smart electrification as it is sometimes called, is defined by Northeast

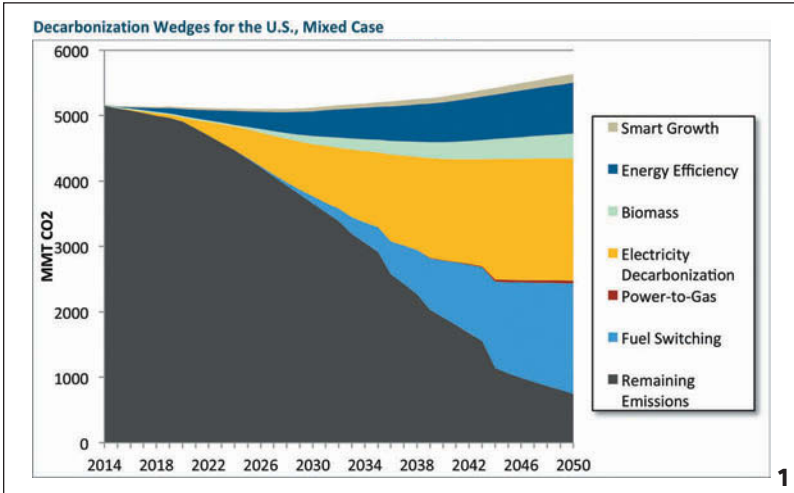


FIGURE 1: A LOOK AT THE GREATEST OPPORTUNITIES FOR DECARBONIZATION.

CREDIT: E3/LBNL/PNNL – PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES (NOVEMBER 2014).

FIGURE 2: DIRECT FOSSIL FUEL USE BY END USE AND SECTOR IN NEW YORK AND NEW ENGLAND.

CREDIT: U.S. ENERGY INFORMATION ADMINISTRATION.



Energy Efficiency Partnerships (NEEP) as powering end uses with electricity instead of fossil fuels in a way that increases energy efficiency and reduces pollution while lowering costs to customers and society as part of an integrated approach to deep decarbonization.

Put this way, strategic electrification sounds like a nebulous concept. It feels as if it is a few steps away from an action plan. Simply put, though, strategic electrification is an energy makeover. It's a shift in the way we think about energy. How do we currently use energy and how can we be more efficient and effective in that use? How can we produce and use energy to create a healthier, more comfortable environment, a planet more resilient to climate change and a more stable grid?

### THE PATHWAY TO DEEP DECARBONIZATION

Although strategic electrification is our best pathway to deep decarbonization,<sup>2</sup> this pathway isn't free and clear. In order to harness the full power of strategic electrification, we must first cultivate both electricity-based technologies, with the potential to meet diverse customer needs and demands, and the markets that support them. The barriers to this growth come in several forms: economic, technical or infrastructural, social or institutional and policy or regulatory. They are challenging but not insurmountable.

### A LOOK AT ELECTRIFICATION OPPORTUNITIES

In the midst of these market barriers that challenge the widespread use of electrification technologies, there is great opportunity. Specifically, a small number of end uses – space and water heating – account for a large fraction of direct fossil fuel use, creating a situation ripe with opportunity. Let's take a look at some of them some of them (Figure 2).

#### 1. Buildings

Based on state assumptions, energy consumption in buildings for thermal energy and HVAC applications across the Northeast region account for roughly one third of all energy consumption

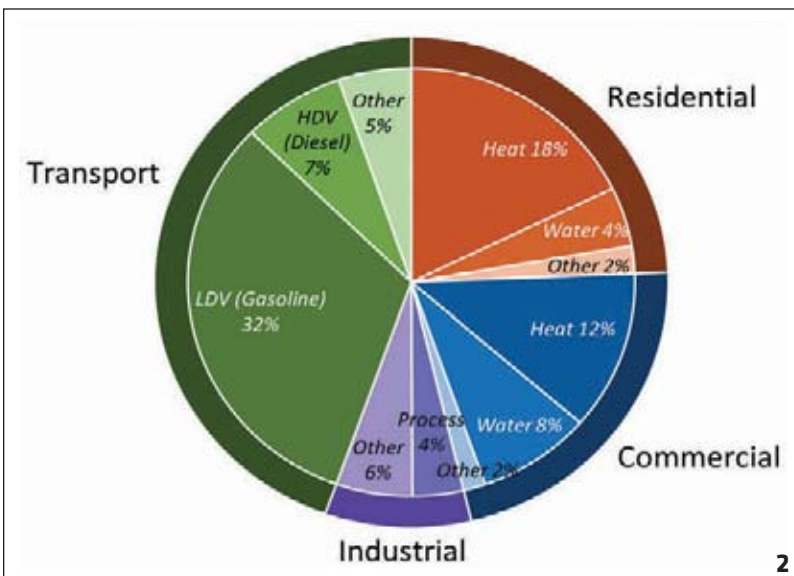






FIGURE 3: A COAL IRON.  
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FIGURE 4: A GAS IRON.  
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FIGURE 5: A  
REFRIGERATION  
DISPLAY.  
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and energy-related GHG emissions.<sup>3</sup> This region is highly dependent on fossil fuels for space heating applications, both residential and commercial. A targeted strategic electrification focus in buildings is the displacement and replacement of fossil fuel equipment used for space heating/cooling and hot water with heat pump technologies that operate at significantly higher efficiencies. Reducing the space-heating load through efficiency, including deep energy retrofits in existing buildings and construction of zero energy homes is a complementary strategy to strategic electrification in buildings. Electrification challenges are minimized when loads are minimized.

Promising technologies that fit this bill come in a few forms. Air-source heat pumps, including mini-split, centrally-ducted and those that perform in cold climates, are the dominant technology in the residential space heating application. Ground-source systems also have a role to play, especially in new construction. For commercial buildings, air-source heat pumps, ground-source systems and variant refrigerant flow offer great opportunity. Lastly, heat pump water heaters are a great electrification option for water heating.

## 2. Industry

The industrial sector is diverse in its range of business models, technologies and direct uses of fossil fuels. Regardless of nuances in these diverse businesses, the two dominant forms of industrial fuel usage are process heating and steam generation. These end uses account for 86 percent of the industrial consumption of fossil fuels nationally.<sup>4</sup> Conversion of just one-fifth of the fuel used for heat and steam to electricity would be equivalent to electrifying the entirety of every other industrial use of fossil fuel.

## 3. Transportation

The transportation sector is just as diverse as the industry sector. Over 90 percent of fuel

used in transportation is petroleum-based,<sup>5</sup> leading the sector to generate 27 percent of greenhouse gas emissions nationwide. Electrification of motor vehicle-based transportation is the most impactful opportunity for strategic electrification in transportation. Replacement of conventional internal combustion engines with electric engines and wide adoption of those electric vehicles is the primary method of electrification in the transportation sector.

There has been rapid EV deployment among states in our region, and we expect continued progress. In order to facilitate this, however, a build-out of charging infrastructure will be necessary. Similarly, switching to an electrified rail is a big opportunity for medium- and heavy-duty vehicles.

## SUPPORTING OPPORTUNITY THOUGH POLICY

It's no secret that regulators in a handful of states across the country are rethinking the business model that currently informs most electric utilities. Bringing the grid into the 21st century without dramatically impacting customer rates is on everyone's mind. Strategic electrification can assist in this re-evaluation by giving us a way to address the opportunities listed above.

The Northeast region is a leader in policies and programs related to strategic electrification. Executive leadership is moving forward on the path toward smarter use of electricity. Here are some highlights:

- Vermont integrated strategic electrification into its state energy plan, added a category of savings for "energy transformation projects" and offered ways to finance air-source heat pumps, heat pump water heaters and electric vehicle charging stations.
- New York provided a policy framework for renewable heating and cooling, offered many rebate and incentive programs for high

CONTINUED ON PAGE 14

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CONTINUED FROM PAGE 12

performance residential and commercial electric technologies and is implementing a time-of-use rate for electric vehicle charging. Under the Reforming the Energy Vision (REV), New York is looking to set a social cost of carbon.

- Massachusetts is in the process of finalizing an Alternative Portfolio Standard to integrate heat pumps and other renewable energy options, offers robust rebates for electric technologies and is expanding the Solarize Mass program to include heat pumps, electric vehicles and storage.
- Rhode Island set a lofty goal of achieving zero-emission passenger and freight rail fleet by 2050, released a Renewable Thermal Market Development Strategy and is exploring workforce engagement and development programs to drive heat pump uptake.


How can we produce and use energy to create a healthier, more comfortable environment, a planet more resilient to climate change and a more stable grid?

### TURNING OPPORTUNITY INTO ACTION

The opportunities listed above are not without many challenges and barriers. But if we look at the policy frameworks being discussed and implemented, we see that forward-thinking states are willing to upend the current energy efficiency paradigm, which has traditionally focused on reducing electricity use. Instead, by focusing on increasing efficiency, reducing pollution and minimizing impact to consumers, policymakers can allow current energy efficiency program paradigms to shift toward the inclusion of strategic electrification. This will produce greater benefits to grid stability, climate mitigation and creation of a healthier environment.

States in the Northeast are already taking actions for continued deployment of renewables, like offshore wind and solar, to address the supply side and encourage electrification. Diverse stakeholders are actively engaged in exploring different aspects of this transformation. NEEP is bringing those stakeholders together to create a more complete picture of the challenges, opportunities and market potential for widespread strategic electrification.

This process of market development, policy reform, data, testing and analysis will help push us to a fundamental change in how energy is used. The iterative process will lead us, one step at a time, to a clean energy future we can be proud of.

To learn more about Northeast Energy Efficiency Partnership's Northeastern Regional Assessment of Strategic Electrification, visit <http://neep.org/reports/strategic-electrification-assessment>. 

### ENDNOTES

<sup>1</sup> Source: U.S. Energy Information Administration.

<sup>2</sup> Energy and Environmental Economics, Inc. (E3), Lawrence Berkeley National Laboratory (LBNL), and Pacific Northwest Laboratory (PNL). *Pathways to Deep Decarbonization in the United States*. UNSDSN. Nov. 2014. Web. <<http://unsdsn.org/wp-content/>

[uploads/2014/09/US-Deep-Decarbonization-Report.pdf](#)>

<sup>3</sup> Estimates vary depending on the state as well as on the scope of building-related energy consumption included in estimates: for example, Rhode Island estimates approximately 35 percent of energy-related GHG emissions are related to thermal energy (RI Division of Planning, 2015. *Energy 2035: Rhode Island State Energy Plan*), New York estimates that 32 percent of energy-related GHG emissions are related to building HVAC systems (which include thermal energy) (NYSERDA, 2017. *RH&C Policy Framework*), and Massachusetts estimates 36 percent of energy-related GHG emissions are related to non-electricity building energy consumption (MA DEP 2016, 2014 GHG inventory).

<sup>4</sup> Source: U.S. Energy Information Administration.

<sup>5</sup> US EPA. Sources of Greenhouse Gas Emission. Web. <<https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>>

### ABOUT THE AUTHORS

**Dave Lis** is NEEP's Director of Technology & Market Solutions and has been a part of NEEP for 11 years, having served in several capacities, including intern, Residential Program Associate, Manager of the Appliance Standards Project and Senior Manager of Market Strategies. He currently leads regional market transformation initiatives for Home Energy Management Systems (HEMS), Air-Source Heat Pumps (ASHP), Strategic Energy Management for the Industrial sector and Strategic Electrification. He has also developed similar regional guidance on how to best accelerate market adoption of specified products throughout the region for several other categories of products.

**Lisa Cascio** joined NEEP in October 2013 as Public Relations Manager. She is responsible for designing and implementing a public relations plan that promotes NEEP's mission and work across multiple channels, including traditional media, social media, digital avenues and in-person events. As part of the Strategic Marketing & Communications Team, Lisa brings visibility to NEEP's work to accelerate energy efficiency as an essential part of demand-side solutions that enable a sustainable regional energy system. Lisa has been in the PR industry since 1996, working in college athletics, higher education and non-profit.

### ABOUT THE PEER REVIEWER

**Chris Powicki** ([chrisp@weeinfo.com](mailto:chrisp@weeinfo.com)) is President of Water Energy Ecology Information & Design Services in Brewster, MA, providing research, planning, analysis, design and communications services to clients ranging from international organizations to individual consumers. He is an adjunct professor at Cape Cod Community College, teaching classes on renewable energy options and solar energy technologies. He also is active in community-based planning, outreach and advocacy focused on promoting electrification and other sustainable energy choices, at all levels.



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# BETTER STEAM HEAT: GENERATING STEAM SYSTEM UPGRADES IN NEW YORK CITY

BY ALI LEVINE

PEER-REVIEWED  
BY MINA AGARABI, PE

**W**inter in New York City comes with many familiar sights and sounds: the tree lighting at Rockefeller Center, sizzling chestnuts on snowy evenings – and radiators banging and hissing all day and night. Seventy percent of large buildings<sup>1</sup> in New York City have steam heating distribution systems that boil water on-site to create steam, which is distributed through pipes to

units to provide heat. Many of these systems were installed decades ago and have not been upgraded or properly maintained since then. The result is often overheated apartments, banging pipes and radiators and a significant waste of energy.

New York City has set out to tackle this problem through the NYC Retrofit Accelerator, a program launched by the NYC Mayor's Office of Sustainability in 2015 that provides free, personalized advisory services to streamline the process of making energy efficiency improvements. The Retrofit Accelerator does not provide direct incentives, but rather one-on-one assistance to help building decision makers understand their options in the market and to connect them with available resources. In December 2016, the NYC Retrofit Accelerator launched a "Better Steam Heat" campaign to educate, motivate and guide building decision makers to complete steam heating system upgrades that will make residents more comfortable, save on utility costs and reduce greenhouse gas (GHG) emissions.

## WHY STEAM HEATING?

New York City has committed to reduce greenhouse gas emissions by 80 percent by 2050 (80 x 50) as part of OneNYC, the City's long-term plan to address sustainability, resiliency, equity and growth. In order to meet the 80 x 50 commitment, the City completed a comprehensive study of NYC's building stock, which accounts for nearly 70 percent of the city's greenhouse gas emissions. This analysis found that the energy used to provide space heating and domestic hot water is responsible for over half of the emissions from large buildings, and that a majority of these buildings have steam heating distribution systems that use more energy on average than other types of heating systems.

The study found that comprehensively upgrading all steam heating systems in the city would lead to a five percent reduction in building-based emissions. Of the nearly 100 potential energy efficiency measures analyzed, these emissions were identified as the single largest potential<sup>2</sup> reduction opportunity.



FIGURE 1: NYC RETROFIT ACCELERATOR BETTER STEAM HEAT CAMPAIGN MARKETING. PHOTO CREDIT: NYC MAYOR'S OFFICE, NYC RETROFIT ACCELERATOR.

Steam heating systems in New York City are often characterized by oversized boilers, improperly-vented pipes, too-high boiler pressure and little ongoing maintenance. This contributes to imbalanced heating across a building, in turn resulting in many overheated apartments in an effort to ensure that no apartments are too cold. Residents in the overheated apartments open windows in the middle of winter to cool off – both a conspicuous waste of heat and major driver of emissions. Outdated or poorly-maintained systems also suffer from “water hammer” – steam being distributed throughout pipes and returning condensate compete for space, causing the banging that keeps residents up at night.

Although implementation is not always easy, there are relatively straightforward solutions to fix these problems. However, until now, few service providers in New York City offered them at scale in the market or as the comprehensive package necessary to get the best results. At the same time, customers were not aware that solutions existed and therefore did not ask for them.

### BETTER STEAM HEAT

The NYC Retrofit Accelerator launched the Better Steam Heat campaign to develop a self-sustaining local market for steam heating system upgrades. The campaign includes:

- 1) defining the necessary upgrades to bring steam heating systems into working order,
- 2) developing the local contractor market to be able to provide these solutions,
- 3) generating demand for the upgrades among building owners, operators, and other decision-makers, and
- 4) providing ongoing technical guidance to both contractors and customers to ensure the work is done properly.

**Defining the Upgrades.** With assistance from technical experts, the NYC Mayor’s Office of Sustainability defined a scope of work to comprehensively upgrade steam heating systems. The scope includes cleaning and tuning the boiler and burner; installing boiler controls; adding master vents to steam piping; installing thermostatic radiator valves (TRVs) in apartment units; and in two-pipe buildings, installing orifice plates on radiator valves with TRVs. Completing all measures together is key to ensure even distribution of heat throughout the building and efficient use of heating fuel.

**Developing the Market.** To build the local market, the Mayor’s Office and the Retrofit Accelerator staff engaged with firms that had staff with relevant skills and developed training, resources and support to help build capacity. After interviewing various types of contractors and potential customers, the City released a request for qualifications (RFQ) for heating service firms and heating controls companies. Customers already rely on heating

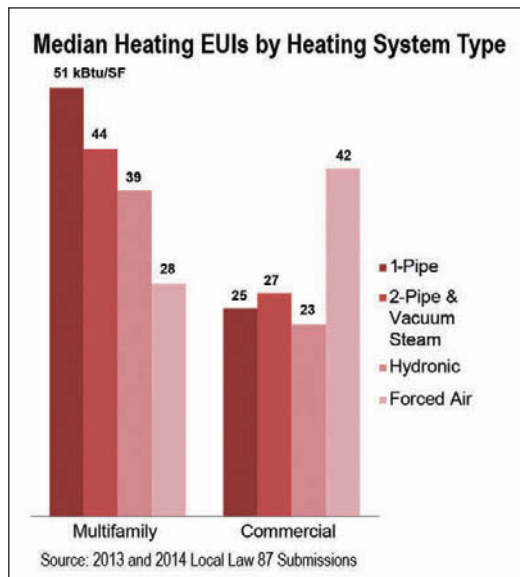


FIGURE 2: MEDIAN HEATING ENERGY USE INTENSITY BY HEATING DISTRIBUTION TYPE (KBTU/SF).

PHOTO CREDIT: NYC MAYOR’S OFFICE, LL87 DATA.

service firms to ensure their buildings have adequate heat throughout the winter. These firms have staff with the skills necessary to perform work in both the boiler room and the distribution system, but were not trained or asked to do so. To become qualified to provide upgrades, the heating service firms were required to send lead technicians to a half-day training and complete on-site assistance with two projects brought in through the program to ensure quality installations. In addition, the Retrofit Accelerator team worked with the city’s utilities to ensure that incentives could cover some or all of the scope of work. In coordination with the campaign, Con Edison launched a program that provides rebates for the majority of the recommended measures for affordable housing with one-pipe steam systems. Over 100 buildings have participated in this program and Con Edison is planning to make a similar offering available to all customers with steam heating.

**Generating Demand.** To build demand among building decision-makers, the NYC Retrofit Accelerator developed a marketing campaign that tapped into issues of comfort and energy waste. To capture the attention of the target audience, the team developed an engaging concept that builds on New Yorkers’ love-hate relationships with their heating systems (figure 1). In addition, the Building Energy Exchange (BE-Ex), a nonprofit partner that provides resources and a physical center for the Retrofit Accelerator, developed a playbook for the upgrades and three case studies. These were paired with two panel events featuring stakeholders from the case study buildings, including co-op board members, engineers, contractors and executive staff from a large real estate developer.

**Technical Guidance.** As with all projects assisted through the NYC Retrofit Accelerator, the program’s team of Efficiency Advisors provide ongoing assistance from start to finish to help ensure

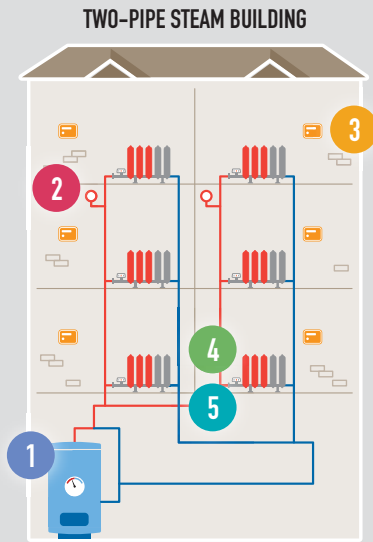


FIGURE 3:

# SMART STEAM HEATING UPGRADES

Most steam heating systems are decades old and haven't been updated. Outdated systems waste heat, cause apartments to be too hot or too cold, and lead to banging or hissing pipes.

There are cost-effective solutions to fix steam heating systems that can save between \$10,000 and \$30,000\* a year on energy costs. The best approach is to address the system as a whole.



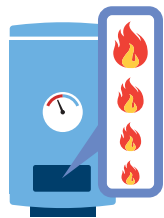
## 1 BOILER TUNE-UP

**Enable burner modulation.** Most boilers can vary their steam output to match the building's needs, but this ability is often bypassed.

**BEFORE**



**AFTER**



**You can also:**

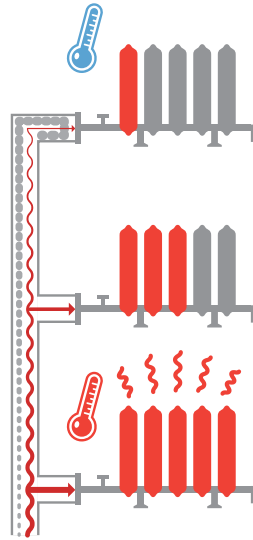
- Clean and tune the boiler
- Regulate and reduce pressure for steam production
- Make sure steam is dry

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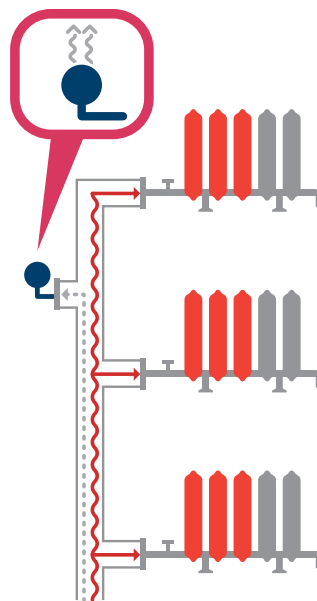
## 2 MASTER VENTING

**Add master vents to pipes.** Without master vents, air blockages in pipes prevent steam from being distributed evenly. This causes some apartments to get too hot, while others don't get enough heat. Adding vents to the tops of risers and at the ends of mains allows air out of the pipes so that steam can fill the pipes and be distributed evenly.

**BEFORE**



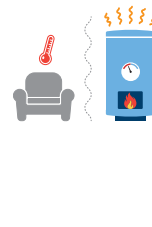
**AFTER**



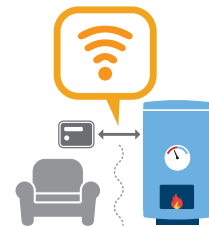
## 3 CONTROLS AND SENSORS

**Install smart boiler controls and sensors.** Most boilers operate based on the outside air temperature, which can lead to overheating. Installing wireless temperature sensors—and boiler controls that communicate with them—allows the boiler to read temperatures inside the building instead. This means units get the right amount of heat at the right time.

**BEFORE**



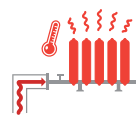
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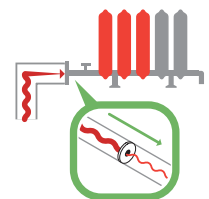
## 4 ORIFICE PLATES (FOR TWO-PIPE STEAM BUILDINGS ONLY)

**End steam trap problems.** Most radiators are too big and produce too much heat. Steam traps on radiators also break, which contributes to banging pipes. Adding orifice plates regulates steam flow and eliminates the need to repair steam traps.

**BEFORE**



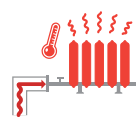
**AFTER**



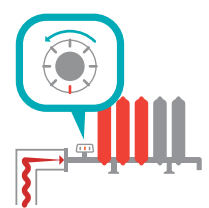
## 5 TRVs

**Add thermostatic radiator valves (TRVs) in apartments.** Without TRVs, there's no way for residents to turn down the heat when an apartment is getting too much steam. Adding TRVs enables residents to control the heat in their units.

**BEFORE**



**AFTER**



\*Based on building size and heating fuel.

projects continue to move forward. The guidance includes assistance choosing a contractor, applying for appropriate incentives, training building staff on how to operate steam systems and even tips and resources for engaging with tenants and residents to complete upgrades in units.

### RESULTS AND NEXT STEPS

To date, the NYC Retrofit Accelerator has trained over 70 contractors and is assisting with the implementation of steam heating distribution upgrades in over 160 buildings. As the NYC Retrofit Accelerator continues its push to upgrade steam heating distribution systems, more and more New Yorkers will learn to love their heating systems again – all while the City continues its mission to reduce greenhouse emissions and fight climate change. 🌱

### ABOUT THE AUTHOR

**Ali Levine** is a Policy Advisor in the NYC Mayor's Office of Sustainability and is responsible for the management of the NYC Retrofit Accelerator Program. Ali joined the Mayor's Office after working at the NYU Furman Center for Real Estate and Policy while completing her Master's of Urban Planning at NYU Wagner. Previously, Ali worked in energy efficiency consulting in Philadelphia and policy and research in Washington, D.C. Ali obtained her bachelor's degree from Lehigh University.

### ABOUT THE PEER REVIEWER

**Mina Agarabi** has more than 12 years of experience troubleshooting, optimizing and designing both steam and hydronic heating systems in large multifamily buildings. She has extensive experience developing portfolio-wide changes to O&M plans and procedures, identifying health and safety issues, LL87 and energy auditing, project management and staff training. Mina serves on American Society of Heating Refrigeration and Air Conditioning Engineer's technical committees; 7.3 Operation and Maintenance, 7.9 Commissioning and SPC 202-Commissioning Process for Buildings and Systems and is a licensed New York State Professional Mechanical Engineer, Certified Passive House Designer, AEE Certified Energy Manager, ASHRAE Commissioning Process Management Professional and a AEE Certified Measurement & Verification Professional. Don't miss her session, "Better Steam Heat: Generating Steam System Upgrades in NYC," at the BuildingEnergy NYC Conference + Trade Show, October 12, 2017 at the TKP Center.

### ENDNOTES

- <sup>1</sup> Buildings over 50,000 square feet, which make up two percent of all buildings in NYC, but nearly half of the built square footage.
- <sup>2</sup> One City: Built to Last technical Working Group Report, p64, [https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/TWGreport\\_04212016.pdf](https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/TWGreport_04212016.pdf)

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## Insufficient Ventilation Traps Contaminants

Ventilation is essential for removing pollutants. Many homes rely on exhaust fans to remove moisture and contaminants. Exhaust fans work by venting polluted air out and require an equal quantity of makeup air to operate properly but tighter homes may not have enough makeup air for exhaust fans to operate well.

## Moisture Issues Cause Mold Growth

Excess humidity can cause mold growth and allows bacteria and dust mite populations to flourish. Moisture from breathing, showering, cooking, and washing must be removed for healthy indoor air. Excess moisture in the basement can degrade home air quality on the first floor.

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# GOING ALL THE WAY: WHAT IT WILL REALLY TAKE TO ACHIEVE NET ZERO ENERGY IN BURLINGTON, VT

BY MIKE CROWLEY

**T**he City of Burlington, VT, is the first U.S. city to establish an energy efficiency utility (EEU), and the first to source 100 percent of its electricity from renewables. It's now renewed its efforts with the recent announcement of a net zero energy goal through its existing Climate Action Plan platform, first proposed by its municipal electric utility, Burlington Electric Department (BED). An impressive list of players have stepped up to this challenge, including a coalition of designers, builders, renewable and energy efficiency experts and financiers. But there are some key challenges that they must overcome. Burlington is a college town, and most of its residents are college students who rent apartments in an aging building stock. The city is growing quickly, with many major developments in the works. This article will chronicle Burlington's net zero strategy and distill transferable lessons learned. What does it really take to radically change an industry to achieve net zero, especially in a place with older buildings and increasing weather extremes?

## ACHIEVING A FLAT ENERGY PROFILE

In 1987 the Burlington Electric Department (BED) was at a crossroads. Many of their energy generation contracts were up for renewal, and they were faced with a hard choice: invest in their own generation sources or renew expensive contracts with electric generators. The Electric Commission looked to recommendations from the Rocky Mountain Institute: instead of building more generation, why not invest in energy efficiency programs that bring down demand? That idea set BED on a long journey, resulting in a 2016 energy demand that was 4 percent lower than in 1989, despite significant growth.

It started in earnest in 1990, when voters passed an \$11M municipal bond that established BED as the

nation's first energy efficiency utility (EEU). Instead of using bond money to invest in new generation, the funds were directed to efficiency programs designed to generate extra capacity by reducing the city's overall electricity demand. Chris Burns, BED's Director of Energy Services said that investment not only yielded a 2:1 savings ratio relative to contracting for power, it also ensured that money stayed local, resulting in a "multiplier effect." The investment enabled BED to build in-house energy efficiency expertise that now resides in Burns' Energy Services Team.

The bond inspired the state legislature to enact a statewide energy efficiency charge; a small charge on all electricity bills that is reinvested in energy efficiency. This charge, combined with the initial bond, enabled BED to invest \$29M and leverage an additional \$32M in energy efficiency investments from its customers over the last 27 years. These investments have effectively flattened Burlington's electricity load, saving an average of \$10M per year.

BED's success gave Burlington the confidence to make a major greenhouse gas reduction commitment through its first Climate Action Plan in 2000. The plan, updated in 2016, commits the city to radically transforming its energy use away from fossil fuels in buildings and transportation.

A key pillar of the city's carbon reduction strategy is what Burns calls "strategic electrification:" efficiently using electricity not just to power buildings, but also cars, busses and even bicycles. From a carbon reduction viewpoint, this strategy makes sense; in 2015, Burlington became the first city in the country to source 100 percent of its electricity from renewable sources.

## A CHALLENGING RESIDENTIAL MARKET

Burlington is a college town. That means that of the ten thousand apartments in Burlington,





60 percent of residents live in rental homes, and up to 70 percent of renters are students. In 95 percent of Burlington's apartments the tenant pays directly for utilities, which greatly reduces incentives for upgrades. "That tells you that to do anything really meaningful beyond changing a lightbulb, you have to come up with something that engages both the tenant and the property owner," said Burns. "That's not easy."

Burlington is a landlord's market. According to Burns, for the past 10 years the vacancy rate has been somewhere between 0.5 and 1 percent. As a result, rents have stayed high. In addition, BED turns over 35 percent of its rental customers every year. That's typical for a college town, and it makes it even more challenging to reach a fairly transient population.

Burns points out that despite these challenges, Burlington's average residential usage is among the lowest in the country, at a little under 400 kWh/month. While Burns says the city's energy efficiency programs contributed to the lower overall energy use seen in the residential market, he acknowledges that many of the city's apartments are in fact relatively small to begin with, with few outlets, and no in-unit laundry. "In many cases the cell phone bill is larger than the electric bill," said Burns.

But lower energy usage is not yet net zero. And Burlington's route to net zero is further complicated by the fact that many residential buildings are older (late 1800s), with poor thermal performance.

"Taking all that into account, it's a tough market to engage," acknowledges Burns.

## CREATING NET ZERO RESIDENTIAL INCENTIVES

Burlington is actively engaging its residents in its net zero strategies in a number of ways. First, in the 1990s the city passed an energy code that applies to renovation projects: energy-affecting components such as windows and boilers need to meet energy code, even if they are one-off replacements. According to Burns, this approach resulted in many small steps, which add up to big savings.

Second, acknowledging that its residential market is dominated by rentals with split incentives to upgrade for energy efficiency, the city passed an ordinance in 1997 that mandates energy upgrades if a building is below a BTU per square foot threshold at the time of sale. This ordinance incentivized new property owners to switch from oil to natural gas. The result was huge: roughly half of all rental weatherization dollars through Vermont Gas have been spent in Burlington.

In addition to codes and ordinances, the city created a series of friendly energy programs. Each year, landlords are required to engage a city building inspector to ensure basic health and safety standards. BED educates the inspectors about energy efficiency upgrades, and in turn, the inspectors promote the program among landlords. BED also created program aimed at residents called the Energy Champ Challenge (named after the mythical sea monster in Lake Champlain called Champ). It's joint program between BED and Vermont Gas intended to unify and simplify how residents can engage the two utilities. The program

PHOTO CREDIT:  
SEAN PAVONE,  
SHUTTERSTOCK.

branding is targeted for each type of residential customer, from single families to multi-families and condos.

## THE COMMERCIAL MARKET

BED only has 3,500 commercial customers (compared to 16,500 residential customers), yet this sector consumes 75 percent of all electricity and natural gas. And the top 20 commercial customers consume 50 percent of all residential and commercial electricity combined.

Burns said that when it comes to new construction, BED used to just rely on the energy code. "We gave them a prescriptive cookbook," he said. BED simply verified that the right equipment was installed without monitoring actual performance. "It was a very prescriptive way of doing things and that's how a lot of new construction programs work across the country."

When the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standard became popular, BED started exploring how they could promote energy modeling. Burns and his team became LEED Accredited Professionals, but they were frustrated that many LEED Certified projects were not improving energy performance beyond code. So they started a new, voluntary program for new construction projects. BED pays 50 percent of the energy model cost up front, then pays 50 percent of energy rebate incentives based on the model upon occupancy. To ensure that the building actually performs as designed, they recalibrate the energy model 9 months to a year later based on occupancy data, and the remaining 50 percent of rebate incentives are paid based on actual performance. If the building is not performing well, BED offers technical assistance to get the building where it needs to be. According to Burns, this assistance is designed to occur within the warranty window provided by general contractors, so many of the corrections are covered.

Almost every new development has participated in the program. Burns said that "it's one of the smartest and best things we've ever done. It completely changes our role, it changes the attitude of everybody on the team. The owners are a little bit reluctant, but once they do it, they want to do it again. We really feel that at the end of the day we end up with a stronger, more persistent energy savings project where everyone's better informed, rather than just filling out a prescriptive form and getting a check."

## DEVELOPING A DEEP RETROFIT STANDARD

In 2015, a local energy efficiency financing firm called Better Building Energy Efficiency (Better BEE) sent Ravi Parikh, an Energy Services Specialist with BED, to the Passive House International conference in Germany. The exchange was organized by Better BEE's CEO Rob Conboy, who was impressed by Europe's rapid adoption of the Passive House standard, and who saw the potential for the same transformation in Burlington. The timing of the conference was ideal - the Mayor had just adopted BED's proposed net zero goal and BED was developing a strategy to engage its aging residential housing stock.


At the conference PHI introduced a new excel-based tool called the Passive House Planning Package (PHPP) designed to provide a step-by-step approach to deep energy retrofits. When Parikh returned to Burlington, he gave a detailed presentation to BED senior staff and the Mayor and recommended that Burlington develop a residential deep energy retrofit program. According to Burns, the presentation was "intriguing and mind-opening" and inspired BED to pursue a new deep energy retrofit standard.

In late 2016, BED awarded Better BEE a contract to develop the standard. Led by Conboy, they began outlining a strategy inspired by similar programs through NYSEERDA, NSTAR and SMUD. But for Conboy, success in Burlington requires a three-pronged platform of financing, training and a program for residents to take a stepped approach to deep energy retrofits.


The key to achieving a net zero Burlington, says Conboy, is to bend the cost curve so that net zero buildings are competitive with code compliant buildings. "We're at the point where cost parity is achievable. And some might go as far as saying that you could build an energy efficient commercial scale project at or below conventional costs," said Conboy. He points to places that have adopted energy standards akin to Passive House performance. "Whether it's Brussels or Germany, or Australia, there was a period of time where the learning curve was subsidized so that either through pilot projects or other means, the knowledge base was grown." That's what Conboy wants to mirror with BED through targeted professional training. The goal is to get contractors to stop "baking their numbers with a 5, 10 or 15 percent adder because they're going to, for example, install windows to a degree that they hadn't before." He points to a training on thermal bridging offered in 2016 that resulted in a project manager bringing the class wall mockup directly to a jobsite. That simple act was a game changer for his company, which now confidently markets high performance buildings at market rates. BED and Conboy believe that every firm in Burlington can do the same.

From an industry perspective, the timing is right for a net zero standard in Burlington. This spring, the entire city was awarded 2030 District Designation. Led by Vermont Green Building Network's Executive Director, Jenna DiMare, the 2030 District is charged by BED to create a roadmap for businesses in Burlington to reach net zero by 2030, starting with benchmarking the energy use of major properties in the city.

Indeed, this knowledge base is already growing in Burlington. A new company called Vermod is designing and building modular homes meant as an alternative to conventional mobile homes. Through efficient pre-fab design and a mix of subsidies from housing trusts and EEU's such as BED, their homes are cost competitive. And, unlike conventional modular homes that depreciate in value, Vermod's homes appreciate in value, much like any other house with a permanent foundation.

Burns acknowledges that he's championing an "audacious plan." Yet the activity in the last year alone has taken the work to new heights, and with it, there is a growing sense of excitement in the building community. That's certainly true for Conboy, who is focused on dispelling myths that this work can't be done. "There's a Yankee, pragmatic way of approaching [net zero] that Burlington is well suited for," he said. 

## ABOUT THE AUTHOR

**Mike Crowley** believes that a sustainable design/build revolution can heal our relationship to each other and the natural world. He is the President of the Yestermorrow Design/Build School. There, he's focused on empowering sustainability and climate leaders - from professionals to Do-it-Yourselfers to change-makers - with design/build skills that make sustainability tangible. Mike holds a Masters of Science from Schumacher College, and has held leadership positions at the Harvard Office of Sustainability and the Institute for Sustainable Communities. 

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AIA, LEED AP BD+C;  
AND MARCELL GRAEFF,  
LEED AP BD+C

PEER REVIEWED BY  
MATTHEW BRODERICK

The Resilient Design Institute defines resilience as “the capacity to adapt to changing conditions and to maintain or regain functionality and vitality in the face of stress or disturbance.” In other words, it is the capacity to bounce back after a disturbance or interruption – events like Hurricane Katrina (2005), Tropical Storm Irene (2011), Superstorm Sandy (2012) and the New England drought (2016). Now that extreme weather events are becoming more common, we need to determine how to adapt to these changes.

Leadership to create new adaptation (or resilience) standards is coming from many angles: government, insurance companies and zoning and building rating systems, among others. As everyone tries to grapple with resilient design and what it means to the building process, the LEED green building rating system has introduced three Pilot Credits on Resilient Design in the Integrative Process category (Figure 1). The credits are: IPpc98 Assessment and Planning for Resilience, IPpc99 Design for Enhanced Resilience and IPpc100 Design for Passive Survivability. The new suite of credits takes a broad approach, providing a holistic framework for design teams to begin tackling this important issue.

We wanted to consider how the new credits could transform the way project teams plan and build their projects. We used three sample projects that we are

familiar with, all designed before the credits came out, as case studies to benchmark how the current Standard of Care measures up to the LEED Pilot Credits on Resilient Design. We found the Resilient Design Pilot Credits require a rearrangement of the design process, the same way that pursuing the Living Building Challenge changes how design teams approach materials selection. Resilient design requires that local conditions and history be incorporated at the earliest stages of design and that livability of projects without power inputs be a primary design driver. This article looks at how each Pilot Credit works within current design methodologies and where our design process needs to change.

## CREDIT IPpc98: PLANNING

IPpc98 Assessment and Planning for Resilience involves identifying the hazards common to the project region and site. This credit encourages assessment and then planning for a wide range of natural disasters or disturbances as well as consideration of longer-term trends affecting building performance, such as changing climate conditions. The goal is to make sure that project teams are aware of the specific natural and man-made hazards that are most common to the project’s location, such as flooding, hurricanes, tornados/high winds, earthquakes, tsunamis, wildfires, drought or landslides/unstable soils. For each hazard the credit

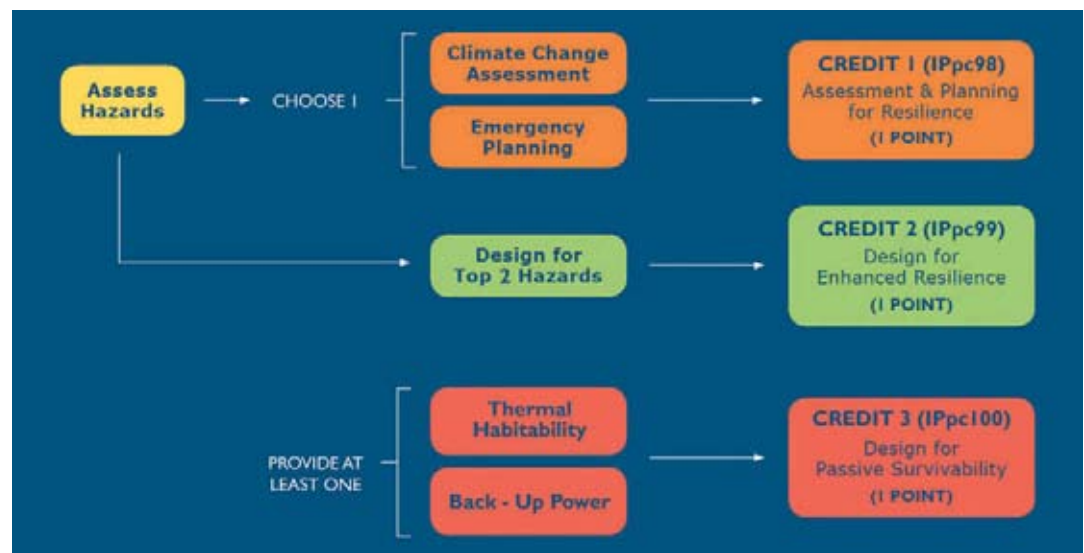


FIGURE 1: A SCHEMATIC STRUCTURE OF THE PROPOSED LEED PILOT CREDITS ON RESILIENT DESIGN. PHOTO CREDIT: JESSIE WOODCOCK, ZGF. UPDATED BY WILSON ARCHITECTS.




	IPpc98											IPpc99			IPpc100					
	Prerequisite						Option 1: Step 1					Option 1: Step 2		Option 2: Red Cross	Hazard 1	Hazard 2	Hazard 3	Thermal Resilience	Back up Power	Potable Water
	Flooding	Hurricanes	Tornado/ Wind	Earthquake	Tsunami	Wildfire	Drought	Landslide	Sea Level Rise	River Flooding	Winter Storms	Temp. Rain, Storm	Option 1: Step 2	Option 2: Red Cross	Hazard 1	Hazard 2	Hazard 3	Thermal Resilience	Back up Power	Potable Water
	Zone VE (EL. 19 ft)	Moderate	Moderate	Category B	Not Applicable	White/yellow	<25%	Low	>7 ft rise	Not Applicable	8-12 per Year;	+5.1F 7.2% 10%	Yes	No	Flooding w/ Waves	Hurricanes	Tornado / High Wind	No	Generator	Modifiable
	Zone X	Moderate	Moderate	Category B	Not Applicable	White/yellow	<25%	Low	> 3ft rise	Not Applicable	8-12 per Year	+5.1F 7.2% 10%	Yes	No	Hurricanes	Flooding (localized)	Tornado / High Wind	No	Generator	Modifiable
	Zone VE (EL. 13 ft)	Moderate	Moderate	Category B	Not Applicable	White/yellow	<25%	Low	<3ft rise	Not Applicable	8-12 per Year	+4.8F 7.2% 10%	Yes	No	Flooding w/ Waves	Hurricanes	Tornado / High Wind	No	No	Modifiable

FIGURE 2: A MATRIX SHOWING HAZARDS EVALUATED AND RESILIENT DESIGN STRATEGIES IMPLEMENTED BY THE DESIGN TEAMS ON THREE NEW ENGLAND INSTITUTIONAL PROJECTS, ORGANIZED BY THE CREDIT STRUCTURE OF THE LEED PILOT CREDITS ON RESILIENT DESIGN. PHOTO CREDIT: WILSON ARCHITECTS. PHOTOS © WILSON ARCHITECTS.

directs teams to look for local data but provides resources for national data and identifies thresholds to determine if you are low, medium or high risk.

At Wilson Architects, we developed a matrix (Figure 2) to track and compare data for the case studies. We used the matrix to track different projects, and it could also be used to track site or design options. We found that, driven by building codes, natural hazards with regional impacts like high wind and earthquakes seem to be well known and generally addressed in projects. However, hazards that could impact smaller areas, such as drought and urban flooding, are not well represented. We found a similar situation with climate change hazards. Regional hazards were well known but the hazards applicable at a finer grain are less well-understood.

The three projects we evaluated in our case studies (shown in the Figure 2 matrix) are institutional projects located in New England where we led the design team. They all happen to be built on urban landfill (land “reclaimed” from tidal waters), so the effects of climate change hazards such as sea level rise and more frequent and intense storms rose to the top of our list of concerns. From our assessment, the top hazards for our two waterfront projects were high winds associated with hurricanes and winter storms, and the accompanying storm surge flooding, sometimes with wave action (Figures 3 & 4). We also learned that the densely developed urban sites, built on land reclaimed from a tidal river, came with

their own surprise hazards not always found on a FEMA FIRM flood map – urban flooding. These urban flooding risks are related to the hardscaping our cities and campuses, aging storm-water infrastructure and the effects of climate change. This discovery came from deeper analysis and understanding of the development and infrastructure history of a site. Local studies, in our case Climate Ready Boston and the City of Cambridge’s Climate Change Vulnerability Assessment, provided an invaluable starting point for assessing the vulnerabilities of our project sites.

### CREDIT IPpc99: APPROACH

Once identified, hazards need to be addressed. IPpc99 Design for Enhanced Resilience provides direction for mitigating the identified risks and points to quantifiable goals for mitigation.

For the projects that we evaluated, we found that the owners and design teams were aware of the highest risk hazards and were planning for the current case; the expected service lives of the projects we looked at are all 50 to 100+ years.

Climate change is a moving target – the further out you look, the greater the delta. As a result, the teams may have underestimated hazards for the entire 100-year life cycle of their buildings.

A benefit of the pilot credits is that they provide an educated starting point – because you have to start somewhere. The pilot credits guide project teams in making assumptions while

CONTINUED ON PAGE 27





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FIGURE 3: AERIAL VIEW OF THE INTERNATIONAL YACHT RESTORATION SCHOOL (IYRS) OF TECHNOLOGY & TRADES NEWPORT, RI CAMPUS. THE CAMPUS IS SITED WITHIN A LIVELY WORKING WATERFRONT DOWNTOWN BUSINESS DISTRICT AND FRONTS HISTORIC THAMES STREET. THE NEW STRUCTURE FOR MARINE SYSTEMS AND COMPOSITES PROGRAMS IS SITED NEXT TO THE EXISTING IYRS FACILITIES ON SPRING WHARF. THE PROGRAM FOR THE BUILDING INCLUDES CLASSROOMS AND TRADE TEACHING AREAS FOR MARINE SYSTEMS, COMPOSITES AND DIGITAL FABRICATIONS ON TWO UPPER FLOORS ABOVE OPEN PARKING, WHICH IS AT THE BOATYARD LEVEL WITHIN THE FEMA ZONE VE SPECIAL FLOOD HAZARD AREA (AREAS OF FLOODING WITH ADDITIONAL HAZARDS DUE TO STORM-INDUCED VELOCITY WAVE ACTION). PHOTO CREDIT: WILSON ARCHITECTS.

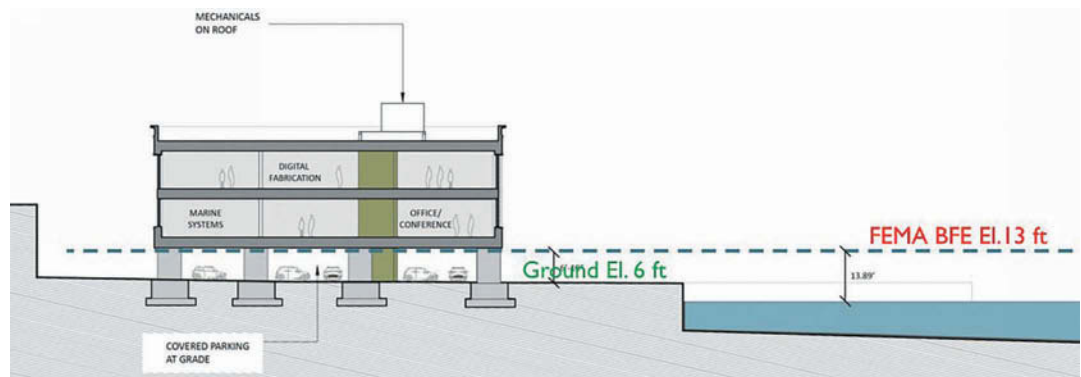


FIGURE 4: THIS SECTION THROUGH IYRS SHOWS HOW THE HABITABLE AREAS OF THE STRUCTURE, THE FLOOR STRUCTURE ITSELF, THE MECHANICAL SYSTEMS, MACHINE ROOMS AND EQUIPMENT ARE ELEVATED ABOVE THE FEMA BASE FLOOD ELEVATION (BFE). THE COVERED AREA UNDER THE STRUCTURE CAN BE USED FOR PARKING. THE CONCRETE AND STEEL STRUCTURE IS DESIGNED SPECIFICALLY TO WITHSTAND WAVE ACTION, WITH FOUNDATIONS SIZED AND PLACED TO RESIST THE EROSION-LIKE EFFECTS OF SCOUR FOLLOWING A STORM SURGE EVENT. PHOTO CREDIT: WILSON ARCHITECTS.

CONTINUED FROM PAGE 25

determining what criteria to meet in their design. Performance during real events can later be assessed and future designs adjusted accordingly.

### CREDIT IPpc100: PEOPLE

The last credit is where we saw the greatest departure from current practices. The intent of IPpc100 Design for Passive Survivability is to ensure that buildings will maintain reasonable functionality in the event of an extended power outage or loss of heating fuel. Power outages are often one of the most important secondary impacts of natural disasters and there is growing concern about terrorist actions targeting energy infrastructure.

In our daily practice, we find that institutional and commercial owners are aware of and addressing their needs for back-up power. Tweaking some of the systems included and/or the duration of function would be enough to meet the requirements of the credit. However, as our case studies showed, the requirements for

thermal habitability (see sidebar) are not typically incorporated into projects. It is the most groundbreaking of the Pilot Credit requirements. Detailed thermal modeling is required to demonstrate that the building will maintain “livable temperatures” during a power outage lasting seven days during both peak winter and peak summer conditions.

Resilience can mean the difference between years of rebuilding vs. days of recovery until we are back to business as usual. In a nutshell, the three Pilot Credits were created to ensure design teams are aware of the vulnerabilities and address the most significant risks in the project design, including functionality of the building in the event of long-term interruptions in power or heating fuel. The new LEED Pilot Credits on Resilient Design provide a holistic framework to create a new design strategy, pushing us to think at a building level and a community level early in the process. Geographic areas that have had a “wake-up call” event are much further ahead in preparedness (living with

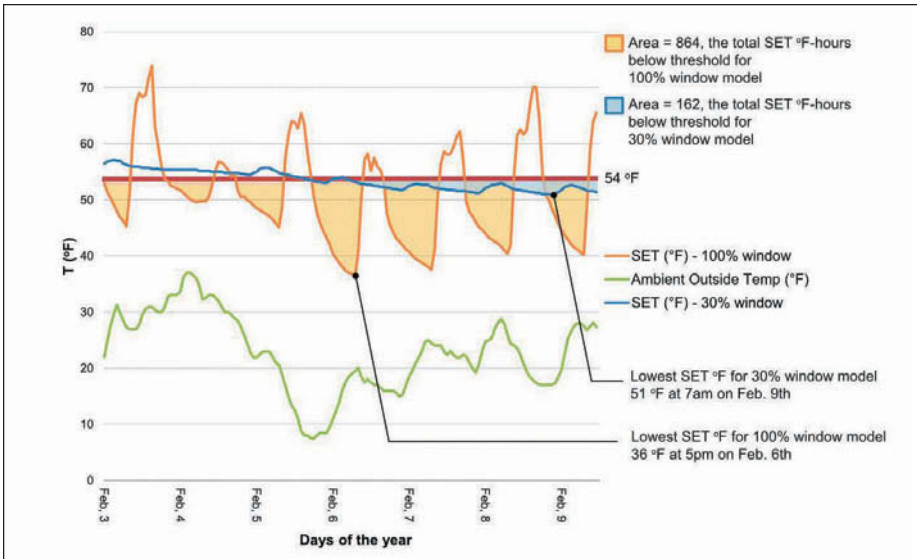


FIGURE 5: WINTER EXTREME COLD WEEK PERFORMANCE. THIS GRAPH SHOWS THE FLUCTUATION OF SET °F DURING THE COLDEST WEEK FOR THE YEAR (FEB. 3 - 9). THE HIGHLIGHTED AREAS SHOW THE TOTAL SET °F HOURS BELOW THE THRESHOLD FOR BOTH MODELS.  
PHOTO CREDIT: TRANSSOLAR KLIMAENGINEERING.

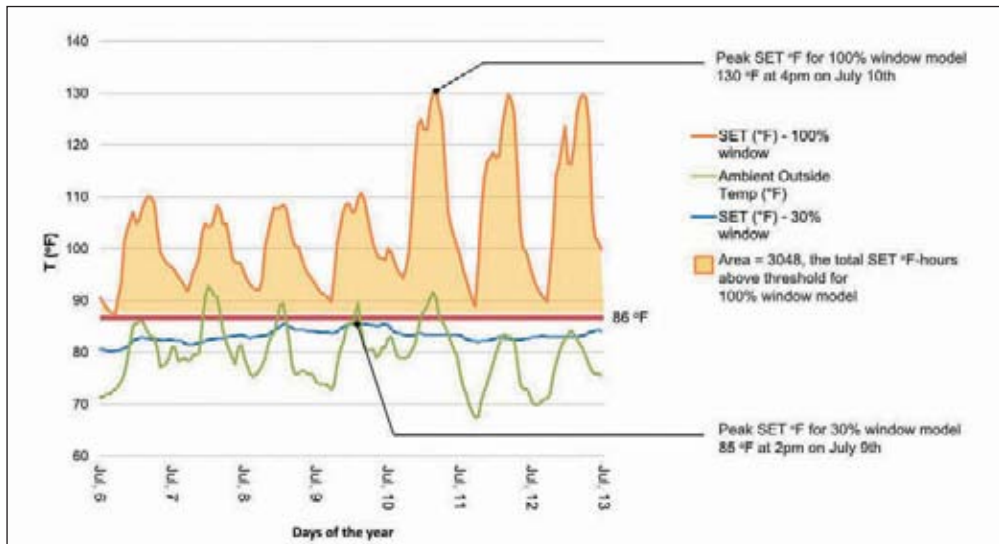


FIGURE 6: SUMMER EXTREME HOT WEEK PERFORMANCE. THIS GRAPH SHOWS THE FLUCTUATION OF SET °F DURING THE HOTTEST WEEK OF THE YEAR (JULY 6 - 13). THE HIGHLIGHTED AREAS SHOW THE TOTAL SET °F HOURS ABOVE THE THRESHOLD FOR BOTH MODELS.  
PHOTO CREDIT: TRANSSOLAR KLIMAENGINEERING.

it means reacting faster). What project teams had been doing as “above and beyond” is quickly becoming the minimum standard for resiliency.

**CALL TO ACTION**

Like it or not, climate change – with more intense storms, sea level rise, heat waves and greater variability in weather – is happening today, and terrorism is now an ever-present risk. These threats call for a new design paradigm: resilience. That is the goal of the LEED Resilient Design Pilot Credits, and that’s why forward-looking design firms are focusing on resilience.

There is a steep learning curve with resilient design, and some of the measures – like redundancy – conflict with the goals of sustainability. We hope that our experiences at Wilson Architects, as we have tested the Resilient Design Pilot Credits

on real-life projects, will inform this unfolding discussion and contribute to creating more resilient and sustainable buildings and communities.

**ABOUT THE AUTHORS**

**Alex Wilson** is President of the Resilient Design Institute, a nonprofit organization working to advance the adoption of resilient design into buildings and communities throughout North America. He is also Founder, in 1985, of BuildingGreen, Inc., a highly respected consulting and information company. He is a widely published writer on green building, energy and the environment. Alex served on the national board of the U.S. Green Building Council from 2000–2005 and in 2008 received their Leadership Award for Education; in 2010 he received the second annual Hanley Award for Vision and Leadership in Sustainability.



**Jim Newman** is Founder and Principal at Linnean Solutions, which provides environmental analytics and benchmarking for corporate, institutional and municipal clients. Linnean's work includes resilience analysis and planning, ecosystem services assessment, life cycle assessment and embodied carbon studies. This work is embodied in Living Building Challenge consulting, EcoDistrict planning and management, and stakeholder engagement processes to strengthen communities. Previous to Linnean, Jim worked with BuildingGreen as the Director of Strategy, where he led the development and introduction of most of BuildingGreen's online products including LEEDuser.com, BuildingGreen Suite and the High Performance Buildings Database.

**Katie Courtney** of Wilson Architects draws on over 13 years of experience with complex projects for academic, commercial and life science clients. She brings an inclusive, hands-on approach to the design process, and is known for thoughtful, enduring and sustainable solutions that connect people and spaces. Katie has a long-standing interest in Resilient Design, attended the 2015 FEMA HURRIPLAN training in Gloucester, MA, and presented at NESEA's BuildingEnergy Boston 2017 Conference. Katie earned a Bachelor of Architecture degree from the University of Notre Dame and is licensed in Massachusetts.

**Marcell Graeff** of Wilson Architects draws on 20 years of experience with complex projects for K-12 and higher education clients. Marcell has a long-standing interest in sustainable design with a focus on high-performance building envelopes, healthy building materials and renewable energy. Marcell earned a Bachelor of Architecture from Syracuse University and presented at the BuildingEnergy Boston Conference in 2017.

**ABOUT THE PEER REVIEWER**

**Matthew Broderick**, AIA, NCARB, LEED AP BD+C, is an Architect and Principal at Ashley McGraw Architects (ashleymcgraw.com) where he leads the Higher Education studio. He has worked on many sustainable, aspirational projects, including multiple LEED Gold buildings. He is currently working on a Living Building Challenge project at Binghamton University which is also targeting Passive House certification. Matt's firm recently joined the BuildingEnergy Bottom Lines program.



# THERMAL HABITABILITY

There are lot of new ideas introduced in the LEED pilot credits on Resilient Design, but the most groundbreaking idea is that of "thermal habitability." As BuildingGreen and the Resilient Design Institute (RDI) have been arguing since Hurricane Katrina struck the Gulf Coast in 2005, we as designers and buildings should be thinking about whether a building will maintain livable temperatures should it lose power for an extended period of time.

Thermal habitability is one of the measures that falls under the Passive Survivability pilot credit (IPpc100), along with backup power. While there has long been an understanding that a better-insulated building envelope will keep occupants safer should there be an extended power outage, Pilot Credit 100 provides a methodology for measuring this aspect of resilience.

The revised version of Pilot Credit 100 (v.2) provides two methods for modeling the thermal habitability of a building. The first method defines a "habitability zone" of 54°F to 86°F, based on *standard effective temperature* (SET), rather than simply air temperature, and defines the number of degree-hours during summer and winter design weeks that can fall outside of that zone. [SET is a temperature metric that factors in relative humidity and mean radiant temperature, in addition to air temperature. (Figures 5 & 6, page 28).

The other metric uses methodology from ASHRAE Standard 55 to show that conditions will remain within a band on the psychrometric chart during summer and winter design weeks that can be reasonably considered to represent habitability conditions. Note that this band of temperature and humidity conditions is far different from the more commonly referenced *comfort zone*.

While the Resilience Working Group has sought to define thermal habitability through the LEED pilot credits on Resilient Design, a similar effort is underway at the Passive House Institute U.S. (PHIUS). The PHIUS+ 2015 Passive Building Standard does a good job of demonstrating that a building will maintain habitable temperatures in the event of a power outage. This certification will likely become a third compliance option for satisfying the thermal habitability requirement in LEED Pilot Credit 100.

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# AIR QUALITY IN YOUR BEDROOM: NIGHTTIME CARBON DIOXIDE LEVELS IN THE BEDROOMS OF 22 VERMONT HOMES

BY BRIAN JUST

PEER REVIEWED BY  
MIKE DUCLOS

While indoor pollutants of concern include particulates, volatile organic compounds (VOCs), moisture, carbon monoxide and radon, carbon dioxide (CO<sub>2</sub>) - which is relatively simple and inexpensive to test accurately - is often considered a proxy for other harder-to-measure pollutants. It has become a common indicator of indoor air quality and is reliably produced in all homes when humans and their pets breathe.

During the 2016-2017 heating season, we tested the indoor air quality in the bedrooms of 22 northern Vermont homes. The study took place from November 2016 through April 2017 and consisted of in-home assessments to measure each home's airtightness, ventilation levels and master bedroom and whole-home volume, followed by four days/nights of measuring carbon dioxide (CO<sub>2</sub>) levels. This testing occurred in the primary occupied bedroom with all of the home's windows closed. Participants

were asked to leave the bedroom door(s) open and closed on alternating days and keep a log of irregular events such as doors opening/closing and people entering/leaving the room.

The CO<sub>2</sub> concentration of 1000 parts per million (ppm) is a commonly used benchmark for "passable" indoor air quality and as a set point for commercial demand-controlled ventilation systems. The homes in the study spanned a wide range of size, age, airtightness, heating system type and occupancy,<sup>1</sup> and represent a reasonable spectrum of existing homes in New England.

During testing, a CO<sub>2</sub> probe-data logger<sup>2</sup> was placed in a draft free location approximately 3 feet above the floor (sleeping height), a minimum of 3 feet from the nearest sleeping being and at least 1 foot from walls.

## HOW DID THESE HOMES DO?

All homes exceeded CO<sub>2</sub> concentrations of 1000 ppm on at least one of the four nights. Periods when bedroom doors remained open had significantly lower CO<sub>2</sub> levels for the majority of homes, yet only one of the 22 homes stayed below 1000 ppm on both door-open nights. Door-closed nights were much worse: 86 percent of homes (19 of 22) exceeded 2000 ppm - double the 1000 ppm threshold - on at least one of the nights with the bedroom door closed and 32 percent (seven of 22 homes) had CO<sub>2</sub> levels that rose above 3000 ppm. One home exceeded the measuring equipment maximum range of 5500 ppm. Full results are shown in Figure 1.

Some homes clearly performed worse than others. In an attempt to establish cause-and-effect, we investigated impacts of airtightness, heating system type, occupant density in the bedroom and ventilation system.<sup>3</sup>

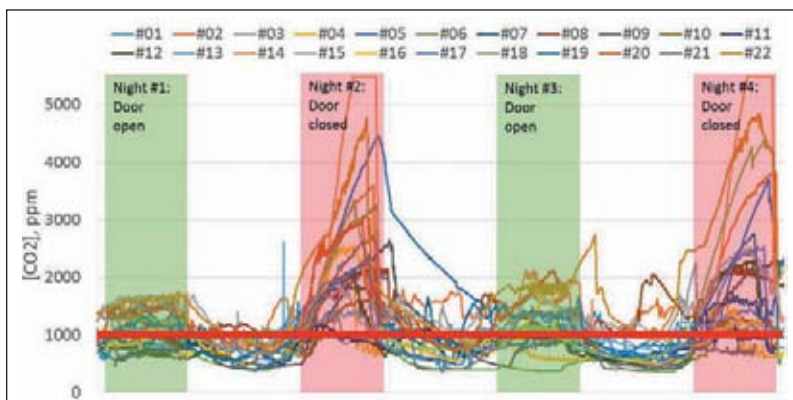


FIGURE 1: CO<sub>2</sub> CONCENTRATIONS VS. TIME FOR 22 HOMES. SHADED REGIONS CORRESPOND TO NIGHTTIME PERIODS OF 9PM-7AM; RED LINE INDICATES 1000 PPM THRESHOLD.

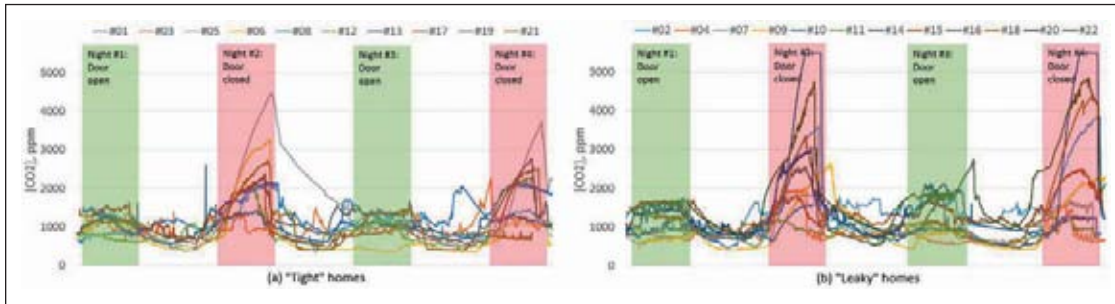


FIGURE 2. CO<sub>2</sub> CONCENTRATIONS VS. TIME FOR (A) 10 HOMES WITH FEWER THAN 3.0 AIR CHANGES PER HOUR AT 50 PA DEPRESSURIZATION (ACH50), (B) 22 HOMES WITH ACH50 OF 3.0 OR GREATER.

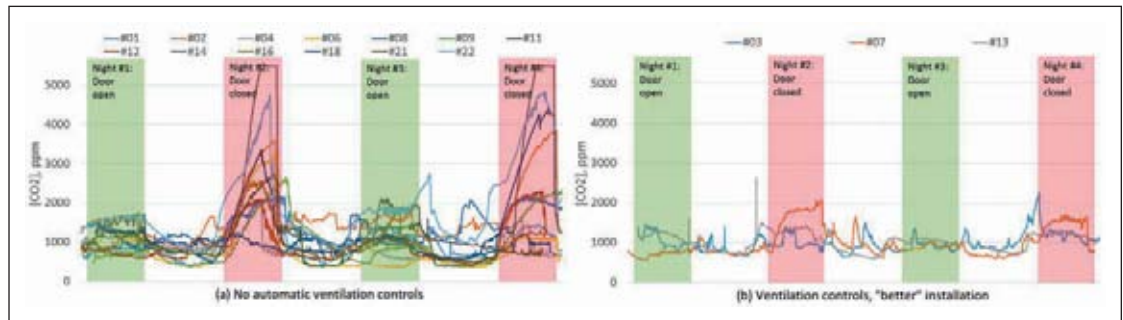


FIGURE 3. CO<sub>2</sub> CONCENTRATIONS VS. TIME FOR (A) 13 HOMES WITH NO VENTILATION OR VENTILATION ON MANUAL SWITCHES, (B) 3 HOMES WITH AUTOMATIC CONTROLS AND VENTILATION WITHIN 50 PERCENT OF THE ASHRAE 62.2-2013 WHOLE HOUSE FLOW RATE; HOME 13 HAS BALANCED VENTILATION AND SUPPLY AIR DELIVERY IN THE TESTED BEDROOM.

Surprisingly, there was little apparent correlation between airtightness of homes and CO<sub>2</sub> concentrations (Figure 2). Comparing homes with heating systems that mechanically “move” air (e.g. furnaces and cold climate heat pumps)<sup>4</sup> with those that do not (e.g. boilers with hydronic distribution) yielded similar results. Data did not show that one system type clearly resulted in “better” indoor air quality. As expected there was a tendency for peak CO<sub>2</sub> level to be higher in homes with more people and smaller bedrooms. However, with doors open – i.e. reduced ability to “trap” air inside the bedroom as people exhale CO<sub>2</sub> during the night – occupant density and bedroom volume had little effect.

Ventilation system was the one variable that clearly stood out as having an obvious impact on air quality. Two homes had balanced ventilation with heat recovery, considered a “best practice” in modern building construction. Seven homes had exhaust-only ventilation with automatic controls; that is, fan(s) operate throughout the day without a person switching them on. The rest – 13 homes – had either no ventilation or ventilation that operated only on manual switches.

Were they constructed today, none of the 22 homes would pass the Vermont energy code requirements for ventilation (which calls for adequate spot ventilation for bathrooms with baths or showers, plus whole-house system flow at sufficient rate with automatic controls).<sup>5</sup> However, the difference between the three homes that came close – those with automatic controls and within 50 percent of the ASHRAE 62.2-2013 whole house flow rate – and the other 19 homes (including home 5, which had a

balanced ventilation system, but without a supply or exhaust register in the bedroom) is dramatic (Figure 3).

## DISCUSSION

While not usually considered immediately dangerous at 1000-5000 ppm,<sup>6</sup> recent studies have linked CO<sub>2</sub> exposure in this range to reduced cognitive function<sup>7</sup> and sensitive individuals may experience headaches, fatigue and a sense of air “stiffness,” to name a few symptoms. Worse, perhaps, is that as an indicator of inadequate ventilation, elevated CO<sub>2</sub> may indicate that if there are sources of VOCs, particulates, moisture and other pollutants in the home – many of them potentially more serious than CO<sub>2</sub> – these may also be present at elevated levels.

While this study involved only 22 homes, results defy the assertion that ventilation is not a concern in older, leakier homes – sometimes referred to as homes that “breathe.” While there may be greater movement of air in these homes, there is not necessarily control of where fresh air is delivered: a leaky home doesn’t give you fresh air where you want or need it. By contrast, homes that approach (even if they don’t meet) current ventilation standards displayed much lower CO<sub>2</sub> levels, even if not below the optimal 1000 ppm threshold. This highlights the need for adequate ventilation in most, if not all, homes – not just new, “tight” homes.

To optimize both ventilation effectiveness and energy efficiency, the approach of balanced ventilation using a heat recovery or energy recovery ventilator – installing an HRV or ERV – is advocated as best practice for new construction and retrofits. This also has the benefit of including high efficiency

filtration such as HEPA or MERV 13 or higher in homes occupied by individuals with allergies or other sensitivities. Simply installing an HRV or ERV “machine” is not enough: proper design and commissioning of such systems – including ventilation directly to bedrooms – is key to “getting what you paid for.”


In situations where installing an HRV or ERV is not feasible, data from this study suggests that retrofitting exhaust fans with automatic controls and ensuring flow rates in accordance with energy codes and ventilation standards is a backup strategy worth considering.

And if nothing is done? At least open that bedroom door at night. 

### ABOUT THE AUTHOR

**Brian Just** is RESNET, CPHC and LEED AP certified. While obtaining his MASC in mechanical engineering, his research focus was indoor air quality and biomass combustion, which deepened his interest in the health impacts of the built environment. Outside of his daytime role working with residential energy efficiency programs at Vermont Energy Investment Corporation ([www.veic.org](http://www.veic.org)), Brian serves on the Board of Directors for the Vermont Green Building Network and volunteers with the International Living Future Institute as an Ambassador Presenter.

### ABOUT THE PEER REVIEWER

**Mike Duclos** is a principal and founder of the DEAP Energy Group, LLC ([www.deapgroup.com](http://www.deapgroup.com)), a consultancy providing a variety of Deep Energy Retrofit, Zero Net Energy and Passive House consulting services. Mike is a Certified Passive House Consultant and PHIUS+ Rater who has designed and certified Passive House homes with PHIUS and PHI, and enjoys ‘measuring things.’ Mike has a BS in Electrical Engineering from UMass Lowell, and two patents. 

### ENDNOTES

- <sup>1</sup> Home size varied from 568 to 5739 square feet. Year constructed (or building envelope substantially renovated) was between 1890 and 2015. Air tightness ranged from 1.5 to 10.0 air changes per hour at 50 Pa depressurization. 10 homes had forced-air heating systems; 12 had non-forced air systems. 19 homes were single-family detached dwellings; one duplex (half) and two single-family attached (multifamily) dwellings were also included. Bedroom occupancy varied from one to three (with children under age four and dogs counting for 0.5), resulting in occupancy/volume ranging from 0.81 to 2.48 people/1000 ft<sup>3</sup>.
- <sup>2</sup> TSI VelociCalc 9565-P meter connected to a TSI 986 probe.
- <sup>3</sup> Other variables including stack effect, outdoor temperature, and wind/wind exposure were not investigated.
- <sup>4</sup> These systems, which include non-ducted cold climate heat pumps and furnace systems that may or may not have a return inside the tested bedroom, do not necessarily result in air exchange to/from the room.
- <sup>5</sup> Ten homes would fail the requirement for spot ventilation. 21 homes would fail the requirement for whole-house system flow; the one home that passed this requirement would fail due to inadequate spot ventilation in one bathroom.
- <sup>6</sup> The Occupational Safety and Health Administration (OSHA) exposure limit for CO<sub>2</sub> over an 8-hr workday is 5000 ppm.
- <sup>7</sup> E.g. (a) Allen JG, MacNaughton P, Satish U, Santanam S, Vallarino J, Spengler JD. 2016. Associations of cognitive function scores with carbon dioxide, ventilation, and volatile organic compound exposures in office workers: a controlled exposure study of green and conventional office environments. *Environ Health Perspect* 124:805–812. DOI: 10.1289/ehp.1510037; (b) Satish U, Mendell MJ, Shekhar K, Hotchi T, Sullivan D, Streufert S, Fisk WJ. 2012. Is CO<sub>2</sub> an Indoor Pollutant? Direct Effects of Low-to-Moderate CO<sub>2</sub> Concentrations on Human Decision-Making Performance. *Environ Health Perspect* 120:1671–1677; DOI: 10.1289/ehp.1104789.

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# INCLUSIVE DIVERSITY KEY TO SUSTAINABILITY

BY HELIANA  
VERÓNICA HIGBIE

**D**espite progress in the United States over the past decade toward implementation of sustainable development policies and practices, the average American remains mystified about how to participate in the greening of our economy. To be most effective, sustainability must be broadly practiced, but myths and mystery around sustainable practices and even the word “sustainability” remain an obstacle. In this essay, I argue that inclusive diversity is the key to demystifying sustainability, which will be necessary to efficiently address the challenges humanity faces, especially climate change. I invite the reader to expand their definition of sustainability while considering how any organization can benefit from nourishing diverse leaders with both visible and invisible diversity traits.

We live in a time where most people understand that centuries of environmental illiteracy have contributed to a loss of ecosystem services and increasing threats to human health and the environment. Yet everyday people struggle with things like recycling. According to a 2015 study by Yale University published by the Nature Climate Change Journal, the average American household sends five pounds of waste, per person, per day to landfills. That means that the average American

discards their body weight in trash each month. According to the Environmental Protection Agency (EPA), American households recycle and compost approximately 34 percent of the waste we generate. Though this figure seems low, the Yale study suggests it is inflated. According to the Yale study findings, Americans only recycle 21.4 percent of the waste we generate. That means 78.6 percent goes unrecycled, which is more than double EPA’s statistics associated with solid waste disposal.

I have observed the mystifying effects of sustainability first hand. We sustainability professionals tend to work on large scales and often in the abstract. As the Director of Sustainability for Yonkers, New York State’s fourth largest city, I had the privilege and opportunity to practice sustainability at the ground level. While my responsibilities went far beyond recycling, that is one aspect of sustainability that has managed to reach people broadly. I was surprised but motivated when I was confronted with how much people struggle with recycling. I found that recycling stations were consistently misused. I wondered whether the misuse was the result of apathy or something else. I discovered that people genuinely wanted to recycle but generally felt unsure about which items were recyclable and which were not, and where those items should be placed. So I spearheaded a project that entailed designing new visual aids to help residents recycle, which they were sincerely interested in doing.

Through my interactions with the community, I discovered that not only did people not know how to sort recyclables, most didn’t have bins, compounding the problem. I was tasked with designing a program to manufacture and disseminate household recycling bins throughout the city.

But the deeper issue I pondered was, why was it falling to me to be designing and re-designing something so basic? Shouldn’t the sustainability field have figured *this* out by now? The conclusion I have come to is that sustainability professionals are not communicating effectively about sustainable

FIGURE 1: RECYCLING BIN  
GIVEAWAY PROGRAM.

PHOTO CREDIT:  
RAWPIXEL.COM



1

# Inclusive Diversity as key to demystifying Sustainability



2

practices because there is a barrier: a lack of diversity.

Sustainability planning needs to embrace diversity in order to be successfully implemented. By diversity, I am referring to people with certain visible or invisible traits such as skin color, age, gender, physical abilities, sexual orientation, religion, culture, ethnicity, national origin, etc. To effectively integrate diversity in sustainability planning will require a conscious effort in promoting inclusive leadership. According to a 2013 study by the Center for Talent Innovation, diverse leadership directly correlates to the bottom-line performance of a company. Furthermore, the study suggests that homogeneity in a company's leadership, along with the failure of management and top executives to appreciate ideas from people who are "unlike themselves" may hinder growth of the organization. It is no different in the field of sustainability.

A 2014 University of Michigan School of Natural Resources & Environment study of nearly 300 environmental organizations shows that over 70 percent of the presidents and chairs are male. The study also reveals that the percentage of minorities on the boards or general staff of environmental organizations does not exceed 16 percent, despite the fact that ethnic minorities and people of multi-racial backgrounds make up a growing 38 percent of the U.S. population. In fact, the study shows that once hired, ethnic minorities are concentrated in the lower ranks, making up less than 12 percent of the leadership positions in the environmental organizations.

At an organizational level, inclusive diversity in leadership increases the credibility and legitimacy of the work of sustainability planning in the eyes of the broad populace. Bringing professionals with various

backgrounds – be it age, sexual orientation, culture, religion, nationality, physical abilities, etc. – into the workforce enables different perspectives. Encouraging perspectives to be voiced is a channel to fostering new ideas. This kind of fresh thinking will likely result in organizations that value new and unique opinions, as well as an inclusive culture. Hiring professionals from various backgrounds is just one aspect of inclusive diversity. Recruiting will be deemed successful when talent is retained and developed into leadership.

In sum, the solution to demystifying sustainability entails re-evaluating the definition of sustainability and how organizations implement strategic sustainability planning. By giving priority to inclusive diversity, you can ensure that the message that is created and communicated is credible and legitimate and reaches a broad audience. Greater diversity of leadership in environmental roles will provide new, more appropriate tools to the public to participate in the fight against climate change, green our economy and promote sustainable development, no matter where they are on the environmental spectrum.

*Note: The opinions and ideas expressed in this article are solely those of the author.*

## ABOUT THE AUTHOR

**Heliana Higbie** has spearheaded the development and implementation of sustainability programs for nearly a decade. She has worked in New York, and throughout North and South America. She has experience working for the United Nations, City Government, the MTA and Fortune 500 companies. Most recently, she has also led the Mayor's Office of Sustainability for Yonkers, the fourth largest city in New York State, with the goal of reducing the state's overall carbon footprint. Heliana is multilingual.



FIGURE 2: INCLUSIVE DIVERSITY AS KEY TO DEMYSTIFYING SUSTAINABILITY.

PHOTO CREDIT: HELIANA VERÓNICA HIGBIE.



# AN INTERVIEW WITH JONATHAN ORPIN

BY JENNIFER  
MARRAPESE

**F**or this issue of *BuildingEnergy* magazine, we're interviewing Jonathan Orpin, founder of New Energy Works Timberframers and Pioneer Millworks, both headquartered in central New York. Started as a small timber frame company, New Energy Works works with Pioneer Millworks to design and build beautiful, energy efficient timber framed buildings. Together, the two companies employ nearly 100 designers, timberwrights, engineers, craftspeople and community members.

New Energy Works' services include architectural design, timber framing, designing enclosure systems, construction and fine woodworking. Pioneer Millworks is the largest domestic source for reclaimed and sustainable wood products. The two companies were among the founding members of BuildingEnergy Bottom Lines, NESEA's triple bottom lines peer network. To learn more about our BuildingEnergy Bottom Lines program, visit [nesea.org/buildingenergy-bottom-lines](http://nesea.org/buildingenergy-bottom-lines).

**Tell me a bit about New Energy Works and Pioneer Millworks. When and how were they founded? Can you describe your businesses to me?**

**JO:** I started New Energy Works (NEW) in the mid-80s as a response to my dislike of plastic vapor barriers. I had read the Saskatchewan Report and discovered SIPs (Structural Insulated Panels) and heavy timber. Then I discovered heavy timber and craft. It was a romance at first sight.

I founded Pioneer Millworks in the late-80s to support my timber framing habit. I was looking for more stable timbers than what were available at the time in Western New York.

**What are the biggest challenges you face in running these two companies?**

**JO:** I am a cowboy at heart. When you grow companies like we have ours, through sheer force of will, and unswerving focus and hard work, rather than proper capitalization and thoughtful management techniques, it's a challenge. We've only started to grow through the latter two (proper capitalization and thoughtful management techniques) recently, in part because I've been smart enough to hire and recruit people who are better than I am at their jobs.

**What drove you to join Bottom Lines?**

**JO:** I joined at the outset, in 2014. I did so for two reasons: one as a favor to John Abrams (a good friend and the facilitator of the Open Matters Bottom Lines

group); and two because I trusted John. I didn't expect much out of participating, possibly because I'd never participated in anything like this before.

**What's been the biggest surprise about Bottom Lines so far?**

**JO:** I am pretty convinced that no one has gotten more out of the program than my co-workers and I have. Seven of us participate, and more of our employees would love to be involved. This is a big investment on our part, both in terms of time and travel. But it's been incredibly useful.

I have learned specific skills through participating: in the form of actual business tools and, even more so, in terms of big picture thinking. I would suggest that both of these are true for my co-workers as well. I've also made new friends. As an owner of a company, friends don't come easily for many complicated reasons. It's really nice to have some new friends.

**You hosted your Bottom Lines group, Open Matters, in April 2016. What was it like to host a meeting?**

**JO:** We have a great deal to share. Our companies are not only the largest in Bottom Lines but we're also chaotic as heck and expanding on all fronts at the same time (see my cowboy comment above). So for us, the hardest challenge was to share our story and resources in as cogent a way as we could with limited time. Bottom Lines gatherings last a total of 48 hours. While that is the right amount of time, it's never enough time.

In addition to having a great deal to share, we have a great number of needs. Part of our challenge was to pick just a few that the group could help us with most.

On the NEW side, for instance, we had just experienced a catastrophic building failure (or, as I like to call it, a bucket of opportunity) of a WWII-era building that housed our fine woodworking division, NEWwoodworks. Seeing this as an opportunity to bring new building technologies to the region and relocate the fine woodworking team to our main campus, we started the journey to a CLT (Cross Laminated Timber) building wrapped with Wood Fiber Insulation. (Editor's note: This project, dubbed "Tomorrowland," was featured in NESEA's BuildingEnergy Pro Tour series in June 2017. It is intended to showcase CLT construction as the wave of the future, offering possibilities for both businesses and housing with dramatic environmental benefits.) There was much more here than just the mechanics of rebuilding, including financing, design and personnel issues. Our group's feedback was extraordinarily helpful.

On the Pioneer Millworks side, we shared our struggle to create a living wage for our staff, given the differences between the a production economy represented by that business and the service economy represented by NEW. They are very different companies, Pioneer Millworks being a linear goods and materials business, NEW being a service provider. Thanks to our Bottom Lines experience, our compensation structure for both companies now reflects that difference.

**Any last thoughts?**

**JO:** I've been a longtime industry leader in timber framing and supporter of developing greater business skills and ethics among timber framers. Bottom Lines has inspired me to work with other timber framing owners and managers, including Christian Goodman of Hardwick Post and Beam (another group member) to bring peer-to-peer network advantages to the timber framing industry. I am also involved in the Northwest Ecobuilders Guild which looks to NESEA's model and leadership. Bottom Lines and some of NESEA's other programs are serving as relevant models for other Triple Bottom Line associations throughout the country.



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# HIGH PERFORMANCE WALLS

BY CHRIS HAMM

PEER REVIEWED BY  
JORDAN GOLDMAN

As the design of high performance building envelopes continues to evolve, so must the process of evaluation. Throughout the past few decades and with the growth of the Passive House standard in the United States, designers are increasingly being forced to create finely tuned shells for their projects that somehow balance cost, ease of construction and increased thermal performance. Not long ago, the wall assembly for a project would have been relatively standard, but a “high performance” wall worthy of a Passive House plaque demands attention from several disciplines often before design development. What has changed in the fundamental thinking about wall construction that has created such an obsession? The answer has to do with a shift in the perception of what makes a building assembly “efficient.”

The definition of efficient is “functioning in the best possible manner with the least waste of time and effort.” With regard to typical construction in the U.S., a wall assembly has historically been considered efficient if it fulfills the structural requirements of the building and creates a sufficient barrier from the elements while being as cheap

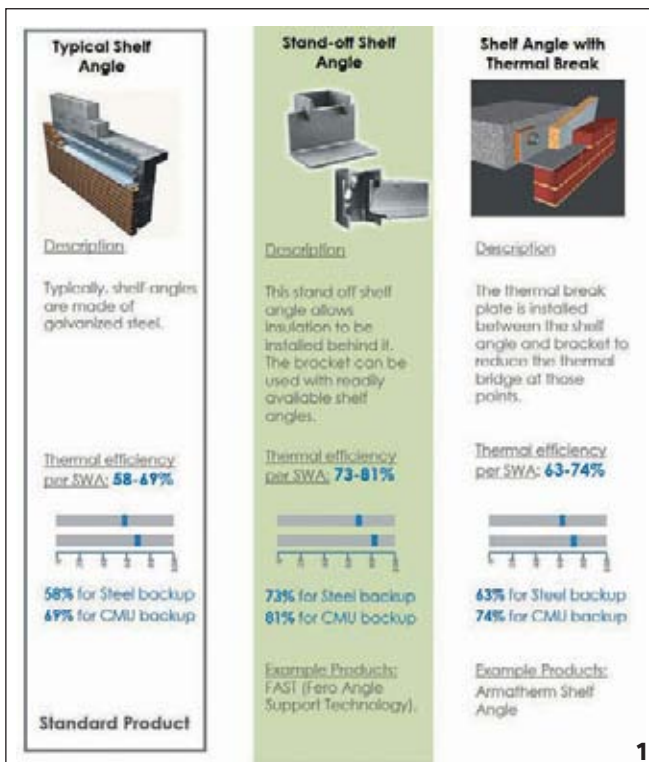
and easy to construct as possible. Additional requirements are inevitably introduced to disrupt this basic equation, but regardless of the project the original criteria always remain. Luckily, stricter building codes have served as the catalyst to push construction toward a new definition of efficiency where thermal energy is as important as time and material cost.

The primary function of a wall has always been structural. Therefore the majority of a wall’s thickness has historically been filled by – you guessed it – structure. Instead of building solid structural walls, lightweight but strong materials act as framing members to cover a greater area at reduced cost while leaving void spaces for which we have found many functions. For instance, filling these convenient spaces with lower density material has become the obvious solution to an otherwise unobstructed flow of sound and heat. As the benefits of such an acoustical and thermal barrier were realized, building codes began to require a certain amount of insulation efficiency. When the concept of super-insulation became popular in the ‘70s, it eventually became clear that this formula of using the structural cavity as the insulation layer was no longer sufficient. Increasing the wall depth to accommodate more insulation also meant beefing up the structure unnecessarily – negatively affecting the cost efficiency of the assembly. Today, in the world of high performance construction in colder climates, it is basically required that some amount of the insulation layer be separated from the structural layer, increasing the efficiency of both components.

Moving insulation out of the structural cavity to the exterior poses a new design hurdle: what will attach the façade to the structure while spanning the gap required for insulation? Many systems exist today to do that and more, varying based on the façade type and backup structure. In addition to supporting the façade, such systems often must hold the insulation in place and leave an air space for ventilation.

So what systems are we talking about? Panelized and lightweight façade materials have the widest array of high performance attachment systems available. For instance, a clip and rail system reduces insulation penetrations while forming a grid to hold insulation, supports a façade and creates an air gap. In addition, a simpler approach is to use continuous girts, almost like a lightweight stud cavity, to hold insulation and support the façade. Not surprisingly,

FIGURE 1: SHELF ANGLES REQUIRED FOR BRICK FAÇADES PRESENT A SIGNIFICANT REDUCTION IN EXTERIOR INSULATION EFFICIENCY. CREATING A THERMAL BREAK BETWEEN THE STEEL AND STRUCTURE CAN MITIGATE THIS EFFECT SLIGHTLY. PHOTO CREDIT: STEVEN WINTER ASSOCIATES.





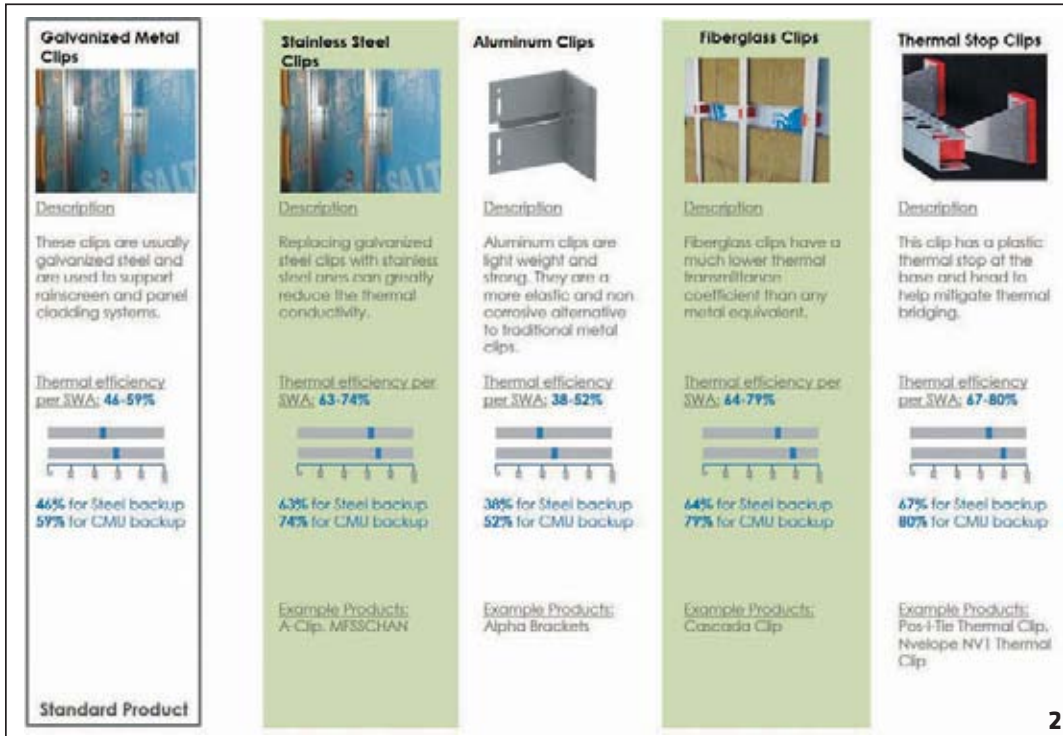


FIGURE 2: CLIP AND RAIL SYSTEMS PROVIDE A STRUCTURE FOR LIGHTER FAÇADE MATERIALS WHILE REDUCING BREAKS IN EXTERIOR INSULATION AND INCREASING FLEXIBILITY.

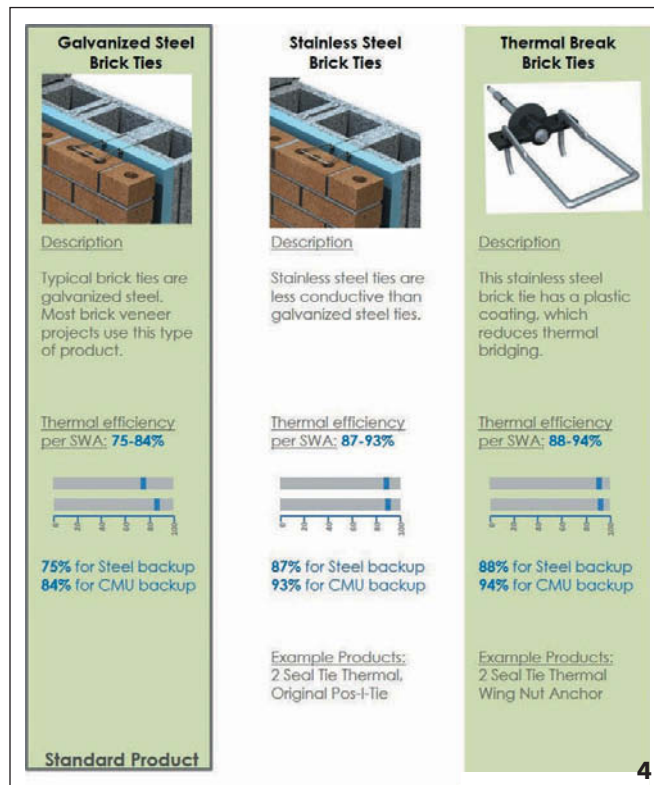
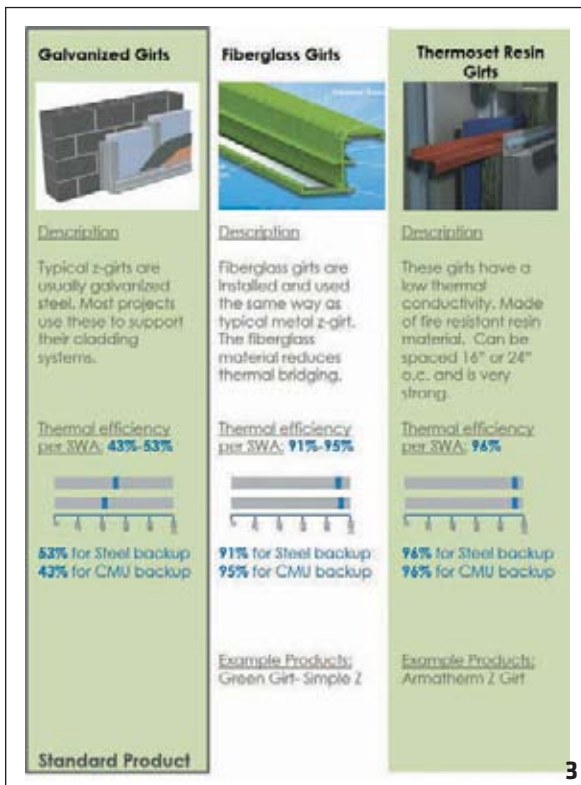
PHOTO CREDIT: STEVEN WINTER ASSOCIATES.

FIGURE 3: CONTINUOUS GIRTS CAN REDUCE THE COMPLEXITY OF AN ASSEMBLY WHILE ONLY SLIGHTLY REDUCING THE EFFICIENCY OF THE EXTERIOR INSULATION.

PHOTO CREDIT: STEVEN WINTER ASSOCIATES.

FIGURE 4: BRICK TIES COMBINE WITH SHELF ANGLES TO REDUCE THE EFFICIENCY OF BRICK FAÇADE ASSEMBLIES.

PHOTO CREDIT: STEVEN WINTER ASSOCIATES.



brick veneer has a very different set of attachment options from the lighter façade materials. The combination of brick ties and shelf angles can be designed to accommodate insulation and an air gap for a high-performance system.

Although simple in concept, the high-performance building world has produced many solutions to serve the same structural purpose with higher thermal

efficiency. So what can a designer do to evaluate these different systems?

First, understand the factors that typically affect the decision of what system to use. Qualitative factors include the product's availability, testing and constructability. Newer products may have long lead times, leading to less flexibility during construction. Similarly, reducing thermal transfer often results

FIGURE 5: THE WEIGHT OF BRICK REQUIRES A SHELF ANGLE AND BRICK TIES TO CONNECT TO A BUILDING'S STRUCTURE. EACH OF THESE ELEMENTS CONTRIBUTES TO A LOSS OF EXTERIOR INSULATION EFFICIENCY. PHOTO CREDIT: STEVEN WINTER ASSOCIATES.

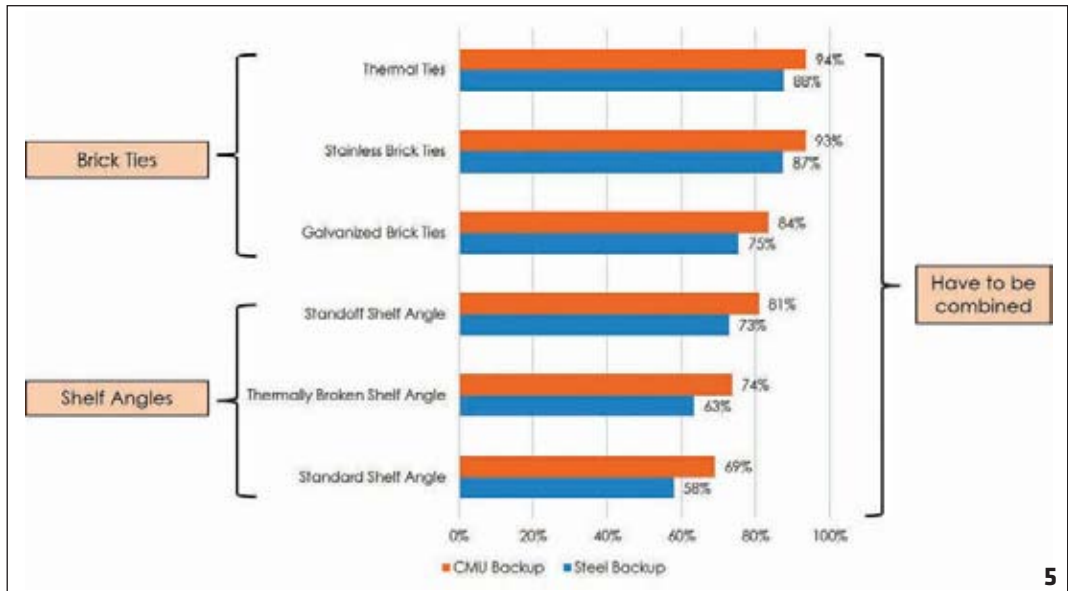
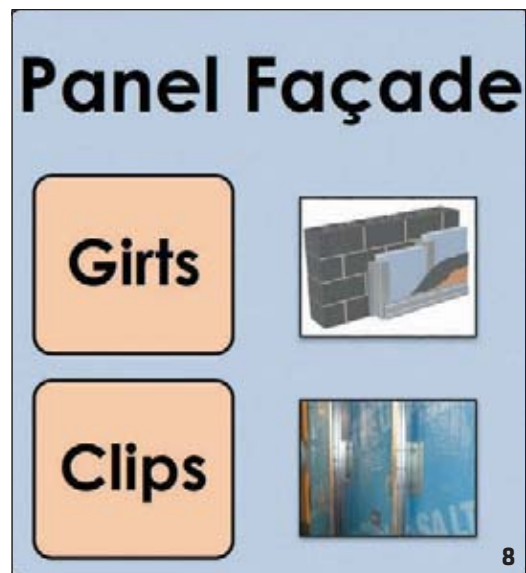
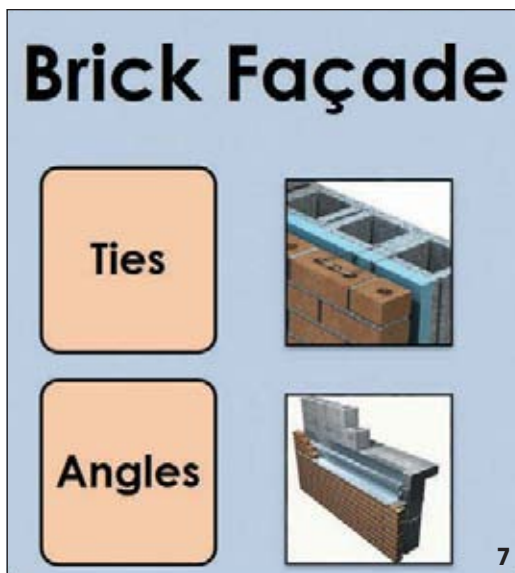
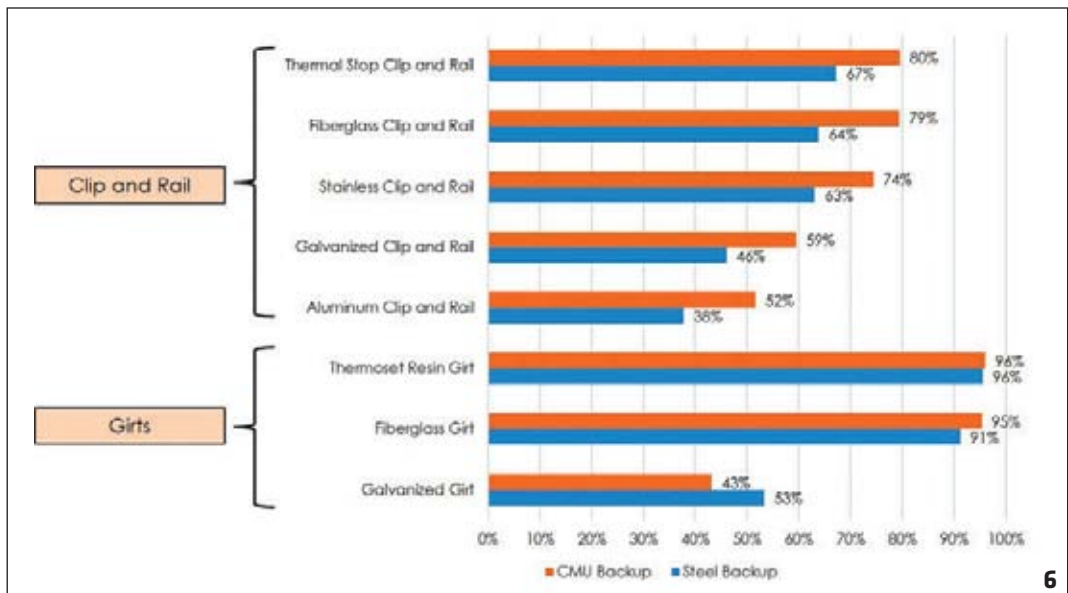


FIGURE 6: LIGHTWEIGHT FAÇADE MATERIALS HAVE A WIDE RANGE OF ATTACHMENT OPTIONS WITH VARYING DEGREES OF THERMAL EFFICIENCY. PHOTO CREDIT: STEVEN WINTER ASSOCIATES.

FIGURE 7: BRICK FAÇADE ASSEMBLIES REQUIRE BOTH BRICK TIES AND SHELF ANGLES. PHOTO CREDIT: STEVEN WINTER ASSOCIATES.

FIGURE 8: TWO ATTACHMENT SYSTEMS FOR PANEL FAÇADES WERE CONSIDERED FOR THIS STUDY. GIRTS CAN BE ATTACHED DIRECTLY TO THE STRUCTURE, OR THEY CAN BE OFFSET FROM THE BUILDING WITH CLIPS. PHOTO CREDIT: STEVEN WINTER ASSOCIATES.



in higher complexity, which can decrease constructability. Finally, depending on the project requirements, NFPA 285 testing may be unavailable for products that are still new or made from less conductive and often more flammable materials.

Quantitative factors include cost, structural efficiency and thermal efficiency: how do the material costs compare, and will they be entirely outweighed by the increase in labor/detailing later on? How deep is the offset required for the insulation and ventilation gap and what is the weight of the façade? Finally, to what degree will the exterior insulation R-value be degraded as a result of the thermal bridging from the attachment system?

While this article does not answer all of these questions, many resources exist to provide guidance. For instance, the Masonry Systems Guide produced by the Masonry Institute and many publications by RDH such as their Technical Bulletin No.11 provide road maps to most of these systems with regard to detailing, constructability and thermal performance.

The research presented in this article evaluates the thermal performance of several systems assuming a uniform layout by quantifying the exterior insulation efficiency. This metric is commonly used in similar studies to evaluate exterior cladding attachment systems and is defined as:

$$\text{Insulation Efficiency} = \frac{(\text{Modeled R-Value})}{(\text{Nominal R-Value})}$$

The base cases for this study were meant to represent typical mid- to high-rise new construction projects in the northeast U.S. The goal was to achieve around an R-30 wall and to evaluate the effect of each system using two different backup systems – a 6-inch steel stud cavity filled with mineral wool and 2 inches of exterior XPS and an 8-inch CMU wall with a 6-inch interior cavity and 2 inches of exterior XPS. All clips were spaced 16 inches horizontally and 24 inches vertically, which is typical if not the worst-case scenario. The modeling was done in a three-dimensional thermal modeling program called Heat3.

This research revealed a few very interesting observations. First, a continuous girt made of a low conductivity material such as fiberglass results in the lowest reduction in efficiency. It is counterintuitive that a continuous fiberglass girt would perform better than intermittent fiberglass clips – the material is the same, but there is less insulation

being interrupted. The difference is that each clip typically requires two screws (in this case galvanized) that penetrate the entire insulation layer, while girt screws only penetrate the sheathing and structure, not the exterior insulation. The cumulative heat flow through these points outweighs the flow through the continuous thin web in the girts. Additionally, the effect of a clip system on the exterior insulation is reduced when attached to CMU as opposed to a steel stud backup structure.

Understanding differences between products early in the design process can save time and money. Structural efficiency and cost are closely tied to the thermal efficiency of a system and achieving a balance between all three will be determined by the design of the entire assembly, from backup system to façade material. This is not as easy a task as it was even a decade ago. In the world of low consumption, the recipe for achieving efficiency calls for an entirely new set of ingredients.

#### ABOUT THE AUTHOR

**Chris Hamm** is a Building Systems Engineer focused on Passive House

design and energy modeling research at Steven Winter Associates. Before working for SWA, he completed his Master's in Product Architecture and Engineering at Stevens Institute of Technology where he oversaw the energy modeling team for the SURE House, a storm resistant Passive House and winner of the 2015 Department of Energy Solar Decathlon. His current work includes several multi-family apartment buildings and college dorms in NYC and around the Northeast U.S. and Canada.



#### ABOUT THE PEER REVIEWER

**Jordan Goldman** is a specialist in energy modeling and mechanical engineering, and manages the HVAC design practice for ZeroEnergy Design. He is fluent in building envelope strategies and energy efficient construction systems, building science design principles, as well as mechanical system design, specification, and sizing for enhanced energy performance. He is a Certified Passive House Consultant, LEED Accredited Professional, and HERS Rater. Jordan studied Environmental Engineering at Cornell University, where he received both a Bachelor of Science and Master of Engineering.



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# SAF<sup>®</sup> – A SOLAR FAÇADE TO STAY?

BY ERIC NELSON

PEER REVIEWED BY  
JENNA IDE

## INTRODUCTION

Since the 60s, many innovative building strategies have been developed that deviate from traditional building practices by incorporating ambient energy sources, especially solar, into the building (skin) for passive heating or cooling, producing warm water or natural daylighting. Examples are the trombe wall or the transparent insulation materials (TIMs), some of which are still in use today in one form or another. However, few concepts have really been able to take hold in conventional building practices. Reasons for that are numerous, and might include cost, energy prices, problems of overheating, durability, life expectancy, maintenance or simply architectural appeal. Most often such systems are add-ons, meaning that they do not entirely replace an existing technology or standard building component (i.e., the cladding, the window or the wall). Breaking from traditional building methods seems to be extremely difficult not only physically, but also psychologically.

Giuseppe Fent, a Swiss architect has extensively studied these systems, especially the concept of transparent insulation materials (TIMs). TIMs absorb solar energy and convert it into heat, which is then transmitted through conduction and radiation, while the typical heat loss through convection is greatly suppressed. However, because these systems have too many drawbacks and can be architecturally challenging to implement, Fent decided to develop his own system that would be highly energy efficient and low-tech, using only eco-friendly materials.

Furthermore, the system was not allowed to be perceived as an add-on, but needed to be an integral part of the building envelope construction and design.

By 1999 he built his first three single family houses with his own invention, a high performance cladding system called Lucido<sup>®</sup> (in Europe only). In subsequent years the system has evolved and found its way into numerous multi-residential, commercial and institutional buildings, both in new construction and deep energy retrofits. A separate, independent company is now marketing and selling this system in North America under the name SAF<sup>®</sup>.

## SAF<sup>®</sup>

Conventional insulation systems decouple the building's interior and exterior climate conditions to the impossible end of creating an airtight, energy-tight barrier between the two. As an antidote to this, SAF<sup>®</sup> incorporates the outdoor energy sources into the exterior skin, creating a thermal sun-warmed buffer that heats up over the course of the daylight hours (Figure 1). After sunset, the wood absorber cools over the next 5 to 9 hours (Figure 2). This cooling period gives the building a thermal buffer against the cold exterior temperatures to which it is exposed. This cycle dramatically reduces the building's heat loss. In summer, when the solar incident angle is higher than in winter, a reverse process takes place: the uniquely angled wood slats of the solid wood heat-absorber shade the façade from direct solar impact while the



FIGURE 1: CLOSE-UP OF THE SAF<sup>®</sup> SYSTEM.  
PHOTO CREDIT: NELSON ARCHITECH GMBH.



FIGURE 2: TYPICAL WALL SECTION WITH SAF<sup>®</sup>. THE SAF<sup>®</sup> SYSTEM WITH A WOOD ABSORBER, AN AIR GAP AND A PROTECTIVE GLASS COVER MOUNTED ON A MINIMALLY INSULATED STRUCTURAL WALL.

GRAPHIC BY NELSON ARCHITECH GMBH.

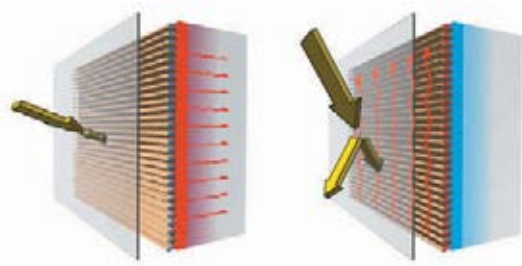


FIGURE 3: SEASONAL PERFORMANCE. WINTER HEATING: MAXIMUM SOLAR ABSORPTION THROUGH INCREASED SURFACE. SUMMER COOLING: INCREASED REFLECTION, MINIMAL ABSORPTION THROUGH SELF-SHADING EFFECT AND VENTING. GRAPHIC BY NELSON ARCHITECH GMBH.

back-vented glass draws excessive heat out of the system much faster, causing the absorber to warm up less than in winter months (Figure 3).

To accomplish this, SAF's core technology comprises: (1) the solid wood heat buffer/absorber, which sits against a conventionally insulated wall; (2) a back-vented solar glass façade applied over the wood absorber to protect the wood from the elements while amplifying the thermal buffering effect, which primarily takes place on the western, southern and eastern facing façades but also, in a lesser fashion, on the northern façade. It is a system that can be applied on the entire building façade making it an equal substitute to any other cladding system, with the major added value of energy performance.

Furthermore, SAF® achieves greater passive solar radiation results with fewer resources than the standard Passive House method, in which insulation of a wall to an R-value of R-60 requires about 40 cm of insulation (fiberglass or mineral wool). This thickens the wall, which deepens the window reveals, decreases the living space, expends more resources and increases insulation costs. SAF, however, can reduce a Passive House wall thickness of 40-50 cm by about half. Finally, SAF® is aesthetically pleasing and provides a new tool for architects seeking to give their buildings uniquely warm, modern appearances.

## CASE STUDIES

The Hofberg development consists of single and multi-family residences with SAF® technology in Wil, Switzerland (Figure 4). It was designed and built by G. Fent, the system inventor. The first (Hofberg 1) in a series of eight buildings was built in 2004, while the most recent (Hofberg 8) was finished in 2016 and features the latest evolution of the system, including integrated PV cells and a mechanically controlled ventilation of the air gap. Each building has a compact building volume; high performance airtight building envelope (triple glazing windows and SAF®); a geothermal heat pump; a mechanical ventilation system with heat recuperation; and a rooftop- or façade-integrated PV system.

In Switzerland, new construction must meet strict energy codes, thus each building has to be modelled



FIGURE 4: HOFBERG DEVELOPMENT IN WIL, ST. GALLEN, SWITZERLAND. ARCHITECTURE BY FENT SOLARE ARCHITEKTUR. PHOTO CREDIT: LUCIDO SOLAR AG.



FIGURE 5: NET POSITIVE ENERGY PROJECT, "HOFBERG 6/7" IN WIL, CANTON OF ST. GALLEN, SWITZERLAND. RECIPIENT OF THE 2012 LORD NORMAN FOSTER SOLAR AWARD. BUILDING IS MINERGIE-P® CERTIFIED (SG-074-P) AND PRODUCES ROUGHLY 180 PERCENT OF ITS TOTAL ENERGY DEMAND. ARCHITECTURE BY FENT SOLARE ARCHITEKTUR. PHOTO CREDIT: LUCIDO SOLAR AG.

BUILDING	YEAR	ENERGY SAVINGS EXCL PV	NET ENERGY PRODUCTION COVERAGE	ADD COST
HOFBERG 1	2004	79%*	84%**	10%
HOFBERG 2/3	2006	78%*	88%**	8%
HOFBERG 4/5	2008	83%*	97%**	9%
HOFBERG 6/7	2012	~80%*	181%***	~10-12%
HOFBERG 8	2016	~80%*	128%***	~8-10%

FIGURE 6: \* COMPARED TO A SWISS STANDARD BASELINE BUILDING; \*\* COMPARED TO A BASELINE ENERGY DEMAND INCL. PV; \*\*\* COVERAGE OF ENERGY DEMAND (100 PERCENT MEANS NET ZERO ENERGY, ABOVE 100 PERCENT WOULD BE NET POSITIVE ENERGY)

for its overall energy consumption. SAF® can help reduce the heating energy demand by up to 80% compared to a standard building. The added cost for SAF® and other energy efficiency measures are about 10%, an investment that pays off in many ways, such as higher comfort, long-term value, better mortgage interest rates, increased living space and, of course, all the energy savings.

All of the buildings are at least Minergie® (Swiss energy label similar to the better known German Passive House standard) certified or better, several have received the Swiss Solar Award

CONTINUED ON PAGE 45

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**FIGURE 7: NET POSITIVE ENERGY PROJECT (121 PERCENT), HOFBERG 8 (2016) IN WIL, CANTON OF ST. GALLEN, SWITZERLAND WITH SAF® E3. MINERGIE-P CERTIFIED (SG-125-P). ARCHITECTURE BY FENT SOLARE ARCHITEKTUR. PHOTO CREDIT: LUCIDO SOLAR AG.**



**FIGURE 8: NET POSITIVE ENERGY PROJECT "CHALET IN NAX," IN NAX, CANTON OF VALAIS, SWITZERLAND. ARCHITECTURE BY GROUPE H, MEYRIN, SWITZERLAND. WOOD ENGINEERING BY CHARPENTE CONCEPT SA, GENEVA, SWITZERLAND. PHOTO CREDIT: LUCIDO SOLAR AG.**

CONTINUED FROM PAGE 43

for Excellence and one (Hofberg 6/7) even received the European Norman Foster Solar Award in 2012 (Figures 5, 6 and 7).

Since the very first SAF® project in 1999 the system has been successfully adapted by many green architects in over a hundred commercial, institutional and residential buildings in Switzerland and surrounding countries.

### SWISS CHALET

SAF® can be produced by locally contracted manufacturers using locally harvested wood. The value of SAF® lies not just in its performance abilities but also in the fact that it can be produced with local renewable resources, keeping the value chain local. It is eco-friendly and carbon neutral. This chalet in Nax (Figure 8), is a perfect example of the vision that drives this invention. It is a net-positive energy and carbon building that can cover its own energy demands as well as the fuel for an electric vehicle to drive 15,000 to 18,000 miles a year.

### FUTURE OF SAF®

SAF®'s passive solar thermal system can be enhanced by integrating photovoltaic technology in a semi-transparent fashion into the outer glass cover. The wood core absorbs both direct sunlight and indirect heat radiating off the back of the PV cells. While the thermal performance may be slightly reduced, the added benefit of producing renewable electricity increases the overall ratio of solar energy used. It is therefore possible to cover the entire energy demand of a building with a single system, especially on taller buildings with a much bigger façade-to-roof surface ratio.

Finally SAF® e<sup>3</sup> marks the next generation in the system's technology by adding a third layer of

solar energy usage and an active measure of controlling its distribution. This triple absorption of solar energy provides a thermal buffer (mass) around the building, waste heat that is extracted from the air gap through a connecting duct system and led into the heat exchanger of a heat pump and renewable electricity to power the heat pump and the rest of the house/facility and/or car (Figure 9). Furthermore, by funneling the sun-warmed air from the air gap into a closed duct system one can mechanically increase or decrease the airflow rate in the air gap, actively cooling down or heating up the thermal buffer and the PV cells. This shifts the energy efficiency more toward the PV power production or the thermal mass all depending on the seasonal and diurnal needs of the building occupants.

### LIMITATIONS

While the material and architectural qualities of glass and wood are undeniable, there are also some limitations. The smoothness and hardness of the glass makes it very durable. The glass in this system is typically a single-pane tempered safety glass, and is very impact resistant. Nevertheless, the chance of breakage through impact cannot be completely eliminated. Tall buildings may require laminated safety glass for human safety instead. Dust and dirt may accumulate on the surface over time but there is no need for active cleaning because the rain washes excessive dirt away and minimizes any impact on its performance.

The drawback of the wood is that it is combustible and therefore subject to fire code restrictions, especially in the commercial building applications. However, in Switzerland, where similar restrictions exist, solutions have been devised to make SAF fire code compliant. The tallest building to date is a seven-story

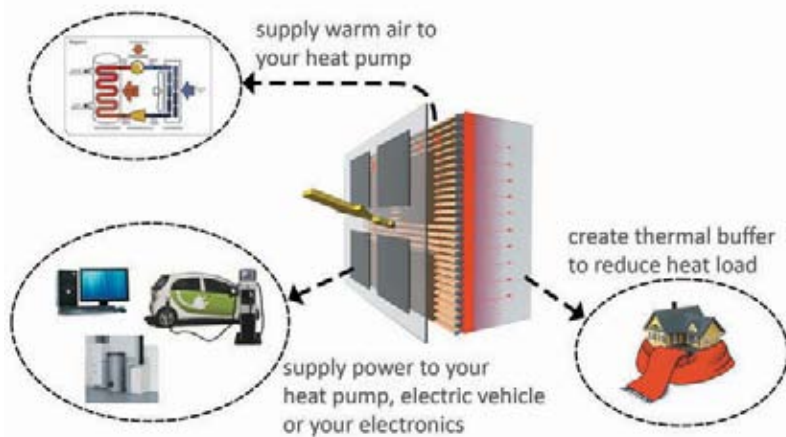


FIGURE 9: SAF® E3 TRIPLE PERFORMANCE, 1) STORING ENERGY IN MASS FOR THERMAL COMFORT, 2) PRODUCING ELECTRICITY THROUGH INTEGRATED PV CELLS AND 3) EXTRACTING WASTE HEAT FROM THE AIR GAP FOR ACTIVE HEATING THROUGH A HEAT PUMP.

low-income multi residential housing project in Geneva. A twelve-story building is currently in the design phase.


The glass and wood together compose a rear-vented system that is about 2.5 inches deep. While some condensation may occur, it evaporates shortly after daybreak. The system is designed to keep water from driving rain out. Due to its depth and the component glass, the system is less malleable than other cladding systems, which poses some restrictions on designing buildings with lots of angles and architectural protrusions. The system clearly favors a more modern architectural design with simple geometric volumes and larger surfaces.

### CONCLUSION


There are many innovative concepts and solutions out there that respond to certain needs or climate zone of a building, such as building ecology, energy and material efficiency, energy

self sufficiency, carbon footprint and design. But few manage to address so many aspects in a single system, making SAF® a truly remarkable and sustainable system. Above all, however, is the long lasting beauty of the natural wood protected behind the glass.

### ABOUT THE AUTHOR

**Eric Nelson**, a former marine scientist and now architect and building energy consultant, was born and raised in Switzerland. He studied Marine Science in the United States, but after graduating and working for the US Geological Survey he realized that he wanted have a greater impact on his immediate environment. He became an architect so he could help shape the world. Finding little awareness of sustainable building practices in the States, he returned to Switzerland to join some pioneers in solar architecture and learn about new solutions and methods to lower the energy demand of buildings, increase energy efficiency and minimize the carbon footprint. He now runs an architecture and energy consulting firm ([www.nelsonarchitech.com](http://www.nelsonarchitech.com)) and is building a business to transfer that knowledge and technology from Switzerland to North America. His firm owns the exclusive rights to market and distribute the SAF system in the U.S. 

### ABOUT THE PEER REVIEWER

**Jenna Ide (LEED AP, AICP, BOC)** is currently the Director of Capital Improvements & Municipal Operations for Salem, MA. She was previously the Director of Energy & Sustainability for Massachusetts (DCAMM), where for 15 years she managed more than 700 energy and sustainability projects worth more than \$450M. She has worked regulating large power projects and in outreach for environmental non-profits. Jenna, an avid outdoor recreationalist, also enjoys art, reading and food. Jenna lives in Salem with her family where she volunteers locally. She also serves on the NESEA Board of Directors. 



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Albert R. Russell has 40 years experience in architecture and the construction industry, specializing in construction documents, construction administration, project management, production management and quality control.

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www.alfandre.com

Alfandre Architecture specializes in the design of energy, resource-efficient, healthy buildings.

**Specialties:** Architecture, Commercial & Institutional, Design Process, Multifamily, Single Family





# BUILDING COMMISSIONING

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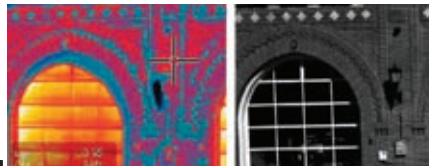
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**Allied Building Contractors, LLC**

1234 West Hill Rd.  
Roxbury, Vermont 05669  
802-485-9563  
info@alliedbuildingvt.com  
www.alliedbuildingvt.com

*Allied Building Contractors is a unique design/build general contracting firm in Central Vermont that has a focus on both the quality of the end result and the client's experience throughout the entire process of the project.*

**Specialties:** Building Design & Construction, Construction Process

**altE Store, Inc.**

330 Codman Hill Rd.  
Boxborough, Massachusetts 01719  
877-878-4060  
sascha.derl@altestore.com  
www.altestore.com

*Founded in 1999, AltE, Inc. has catered to customers on every continent of the globe. A 2006 Inc. 500 awarded company, AltE aims to continue to fulfill its motto, Making Renewable Do-able, by offering cost competitive and high-quality renewable energy related products to Solar Installers and Do-It-Yourselfers.*

**Specialties:** Alternative Energy, Photovoltaics, Solar Thermal, Wind

**Andelman and Lelek Engineering, Inc.**

1408 Providence Hwy. Ste. 334  
Norwood, Massachusetts 02062  
781-769-8773

mike@andelmanlelek.com  
www.andelmanlelek.com

*Andelman and Lelek Engineering, Inc. is an engineering consulting and design firm specializing in building energy modeling, energy efficiency consulting, commissioning services, design of energy efficient HVAC systems, and facilities planning and sustainable building development as related to mechanical systems. We have provided energy modeling and analysis services to utility companies, architects, engineers, and building owners since 2002. Our staff of nine includes six mechanical engineers and one electrical engineer. The two principals have over forty-five years of energy modeling experience.*

**Specialties:** Energy Auditing, Energy Conservation, Engineering

**Anthony J Musso Architect**

504 Harbor Rd.  
Cold Spring Harbor, New York 11724  
631-367-8626  
ajmarchitect@gmail.com  
www.ajmarchitect.com

*An architectural firm practicing sustainable architecture, interior architecture, landscape design and Passive House design. "The architecture for today, respects the past; while solving our contemporary needs in a responsible sensible design."*

**Specialties:** Architecture, Building Design & Construction, Design Process, Landscape Design, Lighting Design, Multifamily, Net Zero Energy, Passive Housing, Single Family

**Antioch University New England (AUNE)**

40 Avon St.  
Keene, New Hampshire 03431  
603-357-3122  
stickner@antioch.edu  
www.antiochne.edu

*Antioch University New England (AUNE) offers a transformative education for passionate students who want to make a difference in the world and create lasting change. AUNE's MBA in Sustainability program focuses on how sustainable practices are implemented in operations, human resources, finance, marketing, and strategic planning in organizations. Competency in sustainability methods, systems thinking, leadership, and collaboration is developed across our integrated curriculum throughout the 36-credit, 2-year weekend program. AUNE also offers the 12-month Sustainable Business Certificate, a credited certificate for people interested in integrating sustainability practices into their businesses and nonprofits.*

**Specialties:** Education

**Aris Renewable Energy**

506 South 9th Ave.  
Mount Vernon, New York 10550  
914-663-2747  
info@ariswind.com  
www.ariswind.com

*Aris Wind, the wholly owned subsidiary of Aris Renewable Energy, is a metropolitan New York City based renewable energy firm that has partnered with Airsynergy to promote, sell and service its Remote Power Unit (RPU) and Total Energy Solution (TES) products in North and South America.*

**Specialties:** Alternative Energy, Manufacturing, Wind

**Ashley McGraw Architects, DPC**

125 E Jefferson St., 15th Fl.  
Syracuse, New York 13202  
315-425-1814  
sandra@ashleymcgraw.com  
www.ashleymcgraw.com

*We may be a 30 year old firm, but we still have the soul of a startup. Our team is energetic and passionate about design. We are flexible, agile, nonhierarchical, and obsessed with your success. We pride ourselves on being really easy to work with, so think of us as an extension of your team, leveraging our expertise to create something really special.*

**Specialties:** Architecture, Commercial & Institutional

**Association for Energy Affordability (AEA), Inc.**

105 Bruckner Blvd.  
Bronx, New York 10454  
212-279-3902  
gspanier@aea.us.org  
www.aea.us.org

*The Association for Energy Affordability, Inc. is dedicated to achieving energy efficiency in new and existing buildings in order to foster and maintain affordable and healthy housing and communities, especially those of low-income. AEA representatives engage in a broad range of educational, technical and construction management activities and services to promote this mission and develop the industry that advances and sustains it.*

**Specialties:** Certifications & Standards, Cities & Communities, Commercial & Institutional, Education, Multifamily, HERS Rater

**Atelier Ten, LLC**

195 Church St., 10th Fl.  
New Haven, Connecticut 06510  
203-777-1400  
newhaven@atelierten.com  
www.atelierten.com

*As environmental design consultants and building services engineers we are committed to high-performance and sustainable design within the built environment. Our core objective is to meet the needs of our clients by developing well-integrated buildings with simple systems that work with natural laws of physics to increase well being, reduce energy consumption and contribute back to the greater environment.*

**Specialties:** Commercial & Institutional, Consultancy, Engineering, Lighting Design, Mechanical Systems & Lighting, Multifamily, Single Family

**Auburndale Builders**

305 Auburn St.  
Newton, Massachusetts 02466  
617-467-4171  
vision@auburndalebuilders.com  
www.auburndalebuilders.com

*We are passionate about high-performance homes: new construction, renovation, Passive and Net-Zero. Our team knows the integrated process necessary for a truly high-performance home and works with the right experts to ensure excellent results. We believe in making the process as good as the product to enhance the lives of those who live there.*

**Specialties:** Alternative Energy, Beyond Energy, Building Design & Construction, Energy Conservation, Indoor Air Quality, Insulation, Net Zero Energy, Passive Housing, Remodeling/DER

**Aurora Custom Builders, Inc.**

98 Winchester St.  
Medford, Massachusetts 02155  
617-320-8287  
hello@aurorabuilds.com  
www.aurorabuilds.com

*We will recommend and specify sustainable materials that have a long life cycle whenever possible—products and construction that harmonize with your environment—both aesthetically and practicality to create energy-efficient and responsibly built spaces. We embrace great design—form, function, color, and materials—whether we are working with your architect or if we are retained as your design team. We see to it that everything (and everyone!) works together to build a space that is as unique as you.*

**Specialties:** Building Design & Construction, Construction Process, Single Family

**Austin Design, Inc.**

16 Call Rd.  
Colrain, Massachusetts 01340  
413-624-9669  
office@austindesign.biz  
www.austindesign.biz

*Austin Design, Inc. provides architectural design services for homes, businesses and communities. We advocate a team approach between client, builder, and architect that encourages the sharing of expertise and a passion for good design.*

**Specialties:** Building Design & Construction, Landscape Design, Architecture



**B**

**B Kim Erslev, Architecture and Landscape Design**

16 Wilde Rd.  
Shelburne Falls, Massachusetts 01370  
413-625-2164  
kim.erslev@gmail.com

*We are an ecologically-based architecture and landscape design firm that works closely with clients to create designs that connect our homes and communities to the power and beauty of the natural world.*

**Specialties:** Alternative Energy, Architecture, Beyond Energy, Composting, Design Process, Envelope & Enclosure, Insulation, Landscape Design, Multifamily, Net Zero Energy, Passive Housing, Remodeling/DER, Single Family, Solar Thermal

**Bakker & Lewis Architects**

243 Jackson Rd.  
Shavertown, Pennsylvania 18708  
570-675-8843  
rob@bakker-lewis.com  
www.bakker-lewis.com

*We are a small architectural firm specializing in designing new and retrofitting existing buildings which are both responsive to individual needs and that contribute to a greener environment.*

**Specialties:** Architecture, Building Design & Construction, Commercial & Institutional, Energy Conservation, Remodeling/DER, Single Family

**Bales Energy Associates**

50 Miles St.  
Greenfield, Massachusetts 01301  
413-863-5020  
info@balesenergy.com  
www.balesenergy.com

*Bales Energy Associates provides whole building energy analyses; high-performance mechanical design; and solar energy & wind energy systems analysis & design services.*

**Specialties:** Building Design & Construction, Cities & Communities, Commercial & Institutional, Consultancy, Consumer Information, Energy Auditing, Photovoltaics

**Basnett Design/Build/Remodel**

14 Gilson Rd.  
Littleton, Massachusetts 01460  
978-952-2552  
jim@basnettdbr.com  
www.basnettdbr.com

*Basnett Design/Build/Remodel is a full service residential remodeling company with extensive experience in all phases of residential construction. We are passionate about energy efficiency, durability, low maintenance, and indoor air quality and bring that passion to every job that includes repair or modification to the building envelope and/or mechanical systems.*

**Specialties:** Building Design & Construction, Remodeling/DER

**Baukraft Engineering**

306 Lafayette Pl.  
Peekskill, New York 10566  
347-674-4287  
cramer@baukraft.com  
www.baukraft.com

*Baukraft Engineering provides design and consulting services for high-performance buildings in the residential and small commercial market, focusing on HVAC systems and enclosure design & detailing for both new construction and renovation projects. Staffed with Certified (CPHC) Passive House Consultants and Professional Engineers (PE).*

**Specialties:** Building Design & Construction, Consultancy, Engineering, HVAC, Passive Housing

**Baxt Ingui Architects, PC**

20 Vesey St., Rm. 900  
New York, New York 10007  
212-233-6740  
info@baxtingui.com  
www.baxtingui.com

*Baxt Ingui Architects, P.C., is an architecture and interior design firm with extensive experience in residential, institutional, and commercial projects. Residential projects include townhouses, apartments, lofts, and country homes. Commercial projects include retail facilities, galleries, and multi-floor law offices. Institutional projects include educational and child-centered facilities.*

**Specialties:** Architecture, Commercial & Institutional, Multifamily

**BCK Law, PC**

271 Waverley Oaks Rd., Ste. 203  
Waltham, Massachusetts 02452  
617-244-9500  
jberstein@bck.com  
www.bck.com

*BCK Law, P.C. is a Firm concentrating in transactional, regulatory and corporate law. While the Firm practices in many different fields, we place a special emphasis on energy, environmental/land use, construction, employment, new media and commercial law and arbitration/mediation services. Our clients include businesses of every size (including entrepreneurial and technology start-ups); cities, towns, counties, regional compacts and state governments; environmental and other non-profit organizations and individuals. Firm attorneys are admitted to practice before all Massachusetts state and federal courts, as well as state and federal courts in Idaho, New York, Vermont, Washington, D.C., and the U.S. Court of Appeals in the Fifth and Sixth Circuits.*

**Specialties:** Professional Specialties: Alternative Energy, Cities & Communities, Construction Process, Electric/Hybrid Vehicles, Energy Conservation, Money & Business, Public Policy, Real Estate, Wind

**Beacon Project Management**

85 Essex St.  
Haverhill, Massachusetts 01832  
978-891-3451  
info@bbpm.com  
www.bbpm.com

*Beacon Bay Project Management is a national firm that continues to grow its talented group of expert hotel project and construction management team. Beacon Bay prides itself on treating our clients like family and has become the leader in the hospitality project management industry. Our team, industry knowledge, technologies, experience, dedication, and quality control have set us apart from other firms.*

**Specialties:** Commercial & Institutional, Consultancy

**Bellwether Craftsmen**

PO Box 63  
Huntington, Vermont 05462  
802-777-3059  
bellwethercraftsmenvt@gmail.com  
www.bellwethercraftsmenvt.com

*Custom craft building and sustainable design: Aspiring to creative collaborations with architects, builders, and clients where quality and integrity are paramount. Bringing visions to life through skill and cooperative process is our specialty.*

**Specialties:** Building Design & Construction, Construction Process, Single Family

**Benjamin & Company, Inc.**

136 Maine St., #5  
Brunswick, Maine 04011  
207-729-7171  
ben@benjamin-co.com  
www.benjamin-co.com

*Building with great care and integrity to create Beautiful, Exceptional, High Performance Custom Homes. We care deeply about what we build and how we build it, and strive to leave our clients with beautiful, comfortable, and functional spaces that will be cherished for generations to come. With decades of combined expertise in hand-cut timber frames, advanced green building techniques, custom design and drafting, and efficient project management, we are proud to offer boutique frame-to-finish services to clients in Mid-Coast Maine and beyond. From traditional mortise and tenon timber frame barns, to Net Zero Energy custom homes, Benjamin & Company can work with you to bring your dreams to life.*

**Specialties:** Building Design & Construction, Net Zero Energy, Single Family

**Benjamin Nutter Architects, LLC**

43 Canterbury Hill Rd.  
Topsfield, Massachusetts 01983  
978-887-9836  
info@benjaminnutter.com  
www.benjaminnutter.com

*In the past 30 plus years, Benjamin Nutter Architects has transformed over 400 homes and landscapes in New England. As Principal Architect, Ben Nutter works closely with his talented team of architects and designers providing even more expertise to a project. A team approach allows every detail to receive the careful attention it deserves, right down to the color of a light switch! Each member of the Benjamin Nutter Architects team has one goal in mind, to provide each client with their dream home.*

**Specialties:** Architecture, Energy Conservation, Single Family

**Bensonwood**

6 Blackjack Xing.  
Walpole, New Hampshire 03608  
877-203-3562  
info@bensonwood.com  
www.bensonwood.com

*Bensonwood is acknowledged as a premier designer-builder of energy-efficient timber frame, hybrid and other high-performance homes, and commercial buildings. Our mission is to find better ways to build, while consistently improving people's lives. Bensonwood is also deeply engaged in bringing a vision of sustainability to the future of housing. We understand that the housing industry must change so it is both responsive to the consumer and responsible to the earth. To create a sustainable society one must build sustainable homes—with approaches to home building that link beauty, craft, ecology, wise resource use, simplicity, and elegance.*

**Specialties:** Building Design & Construction, Design Process

**Berkshire Photovoltaic Services (BPVS)**

46 Howland Ave., Ste. 3  
 Adams, Massachusetts 01220  
 413-743-0152  
 info@bpvs.com  
 www.bpvs.com

Since 1985, Berkshire Photovoltaic Services Inc. (BPVS) has provided the highest quality design and installation of efficient and durable photovoltaic systems for residential, commercial & institutional customers. We have a long history providing innovative solar plus storage design/installation services for off grid, stand by and dedicated load applications as well as turnkey utility interactive PV systems.

**Specialties:** Alternative Energy, Beyond Energy, Building Design & Construction, Certifications & Standards, Cities & Communities, Commercial & Institutional, Construction Process, Consultancy, Consumer Information, Design Process, Education, Energy Auditing, Energy Conservation, Engineering, Envelope & Enclosure, Home Inspection, HVAC, Indoor Air Quality, Insulation, Manufacturing, Multifamily, Net Zero Energy, Photovoltaics, Public Policy, Remodeling/DER, Renewables & The Grid, Research, Roofing, Single Family, Solar Thermal, The Big Picture, Electrical

**Beyond Green Construction**

13 Terrace View  
 Easthampton, Massachusetts 01027  
 413-529-0544  
 info@beyondgreen.biz  
 www.beyondgreen.biz

Beyond Green Construction is a family owned and operated green building company based in Easthampton, MA. The BGC family, Sean, Andy and Jamey Jeffords, were raised in a tradition of craftsmanship, developed through apprenticeships with their father's company specializing in historic restoration and fine woodworking. The brothers honed their skills with additional education and experience for cutting edge green building, insulation and alternative energy techniques to prepare properties to meet the energy challenges of the 21st Century.

**Specialties:** Remodeling/DER, Insulation

**Big Green Real Estate**

134 Goodrich Four Cors.  
 Norwich, Vermont 05055  
 802-291-4106  
 celina@celinabarton.com  
 www.biggreenrealestate.com

Serving Buyers & Sellers in the Connecticut River Valley of Vermont & New Hampshire. Celina Barton has deep local knowledge, love of the landscape and experience in the Upper Valley marketplace, and is passionate about providing best in class service to her clients. She is well known for her dedication to client-over-company ethics, professional and responsible service, creative thinking and project management skills. She has been praised for her ability to simplify complex processes; and her engaging and energetic approach to finding solutions to difficult issues.

**Specialties:** Real Estate, Single Family

**Black Mountain Architecture**

16 Academy St.  
 Saranac Lake, New York 12983  
 518-354-8340  
 info@blackmountainarchitecture.com  
 www.blackmountainarchitecture.com

Black Mountain Architecture provides exceptional service, thoughtful design, and step-by-step education enabling clients to meet their goals. The firm specializes in high quality, regionally focused design; high performance energy consulting; and ecologically sensitive landscape design. With a focus on sustainable design, BMA can help clients achieve a variety of objectives from LEED certification and NetZero energy use to ensure that your home is healthy and situated gracefully on its site.

**Specialties:** Architecture, Energy Conservation, Landscape Design, Multifamily, Net Zero Energy, Single Family

**Blue Sea Development Company, LLC**

164 Main St.  
 Huntington, New York 11743  
 631-923-0081  
 les.bluestone@blueseadev.com

Blue Sea Development Company/Blue Sea Construction Company is an affordable housing developer/general contractor working primarily in the New York City metropolitan area.

**Specialties:** Building Design & Construction

**Bontrager Custom Builders, Inc.**

1134 Bridgewater Ctr. Rd.  
 Bridgewater Corners, Vermont 05035  
 802-356-1856  
 brian@bontragercustombuilders.com  
 www.bontragercustombuilders.com

I am a building contractor with 30 years of experience in the building and remodeling business of building fine custom homes.

**Specialties:** Building Design & Construction, Single Family

**Boston Solar Company**

55 Sixth Rd.  
 Woburn, Massachusetts 01801  
 617-858-1645  
 info@bostonsolar.us  
 www.bostonsolar.us

Boston Solar is the #1 residential solar contractor based in Massachusetts, with over 3,000 installations in only 5 years. We are proud to power Massachusetts, a state that continues to lead the nation in solar installations. We provide superior products, exceptional customer service and the highest quality workmanship. Boston Solar is dedicated to helping customers save money, while improving the environment and supporting our local community. Every member of our team is focused on delivering the best experience for every customer. Are you ready to join your neighbors as they take part in the national drive toward energy independence? Learn more about why Boston Solar is the best choice for your home or business. Solar. Savings. Simple!

**Specialties:** Alternative Energy, Commercial & Institutional, Multifamily, Photovoltaics, Single Family

**BPC Green Builders, Inc.**

523 Danbury Rd., Unit 1 Rear  
 Wilton, Connecticut 06897  
 203-563-9909  
 ctrolle@bpcgreenbuilders.com  
 www.bpcgreenbuilders.com

Green building for new and existing homes based on building science and sustainability criteria. Award-winning builder with extensive local experience. 100% Energy Star (EPA) and Zero Energy Ready Homes (DOE). PHIUS Passive House, LEED for Homes (USGBC). PHIUS Certified Passive House Consultant services available.

**Specialties:** Building Design & Construction, Consultancy, Remodeling/DER

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**413-584-8844**

[www.valleysolar.solar](http://www.valleysolar.solar)

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## **Briber & Pollitt**

113 Concord Rd.  
Wayland, Massachusetts 01778  
508.358.0768  
frankebiii@me.com

**Specialties:** *Passive Housing, Single Family*

## **Briburn**

28 Maple St., Ste. 202  
Portland, Maine 04101  
207-847-3788  
cbriley@briburn.com  
www.briburn.com

*Design Philosophy: "Architecture for life" is the creation of architecture that is timeless, environmentally friendly, beautiful, and long-lasting. Architecture that focuses on the experiences of the building's occupants, enhancing their daily lives with natural daylight, excellent ventilation, and delightful spaces that engage their artful minds, architecture that is mindful of our finite resources and respectful of the natural environment. It is architecture that will stand the test of time by being very durable, simple to operate, economical to maintain, and beautiful.*

*Our Mission: Briburn is committed to creating innovative, energy efficient, green solutions for residential, commercial, Institutional and civic projects that artfully reflect our client's needs and interests.*

**Specialties:** *Architecture, Beyond Energy, Building Design & Construction, Design Process, Education, Indoor Air Quality, Multifamily, Net Zero Energy, Passive Housing, Single Family*

## **Bright Energy Services**

9030 Fort Hamilton Pkwy.  
Brooklyn, New York 11209  
347-470-7090  
info@brightenergyservices.com  
www.brightenergyservices.com

*Bright Energy Services is an award-winning energy and environmental consulting firm in the Energy Efficiency, Renewable Energy, Cleantech & Sustainability Markets. The firm deploys tailored energy efficiency solutions and leverages renewable energy technologies. Our services allow clients to cut energy costs, meet regulatory requirements, manage their emission portfolios, deploy the latest technology and reduce their carbon footprint. Our consulting services span many disciplines, focusing on providing commercial, industrial, and institutional buildings environmental improvements through energy auditing, retro-commissioning and building analysis, bench-marking, energy load reduction, LEED® and Energy Star certification, greenhouse gas inventories, and sustainability program development.*

**Specialties:** *Alternative Energy, Certifications & Standards, Cities & Communities, Commercial & Institutional, Composting, Construction Process, Consultancy, Design Process, Education, Electric/Hybrid Vehicles, Energy Auditing, Energy Conservation, Engineering, Envelope & Enclosure, Fuel Cell, HVAC, Indoor Air Quality, Insulation, Lighting Design, Lighting Supply, Marketing, Mechanical Systems & Lighting, Money & Business, Multifamily, Net Zero Energy, Passive Housing, Photovoltaics, Real Estate, Renewables & The Grid, Roofing, Solar Thermal, Windows, Electrical*

## **BrightBuilt Home**

102 Exchange St., 2nd Fl.  
Portland, Maine 04101  
207-842-2888  
info@brightbuilthome.com  
www.brightbuilthome.com

*On the leading edge of sustainability and design, award-winning firm Kaplan Thompson Architects founded BrightBuilt Home with the goal of providing more beautiful, healthy and low-energy homes for the American homebuyer. To optimize affordability, we rely heavily on supreme geekery married with years of custom design experience and construction knowledge. Sketches and cost spreadsheets are used hand-in-hand with energy models in order to optimize each home and reduce its carbon footprint. As a partnership between design professionals, modular builders, and site contractors, we can keep our fingers on the pulse of the industry at large. As a team, we stay current on all aspects of home-building, from design innovations to pricing projections to best construction practices to more!*

**Specialties:** *Building Design & Construction, Multifamily, Net Zero Energy, Social Services*

## **Brisette Electric, Inc.**

PO Box 4904  
Vineyard Haven, Massachusetts 02568  
508-693-0764  
jarret@briselectric.com  
www.briselectric.com

*Brisette Electric, Inc. is a Martha's Vineyard based electrical contractor committed to customer service and quality. Our electricians take a team approach on every job and are dedicated to providing quality and performance that will exceed expectations. We enjoy working with people, and will do everything possible to complete your project in a professional and timely manner.*

**Specialties:** *Construction Process*

## **Brooks Post & Beam, Inc.**

208 Pettingill Hill Rd.  
Lyndeborough, New Hampshire 03082  
603-654-3210  
paul@spbrooms.com

*http://www.brookspostandbeam.com*  
*Brooks Post & Beam has been building energy efficient, sustainable homes throughout New England for over 40 years. We have been building homes, barns and commercial buildings sustainably for decades. We are a small company focused on improving our quality*

**Specialties:** *Building Design & Construction, Single Family*

## **Brown Lindquist Fenuccio & Raber Architects, Inc.**

203 Willow St., Ste. A  
Yarmouthport, Massachusetts 02675  
508-362-8382  
kate@capearchitects.com  
www.capearchitects.com

*Brown Lindquist Fenuccio & Raber Architects, Inc. is a diversified architectural firm located in historic Yarmouthport, Massachusetts. We provide comprehensive architectural and consulting services to a wide range of Commercial, Civic and Residential clients.*

**Specialties:** *Architecture*

## **Bruss Project Management, LLC**

17 Springfield St.  
Concord, New Hampshire 03301  
603-856-8218  
mdbluss17@gmail.com

*Bruss Project Management provides Project Management Service from project start to completion. We work with Owners to tailor a scope of services uniquely suited to their project needs.*

**Specialties:** *Commercial & Institutional, Construction Process, Consultancy, Design Process, Single Family*

## **Building Shelter, Inc.**

PO Box 2297  
Vineyard Haven, Massachusetts 02568  
508-693-7734  
info@buildingshelter.com  
www.buildingshelter.com

*We build homes from nature. Our construction practices are based on building science and the tradition of our trade. Our team is trained to understand how buildings work well and why they can cause harm. We are RESNET trained, a Certified Passive House Builder, Certified Passive House Consultant, EPA Lead Safe Certified Firm, certified Building Performance Institute Home Analyst Professional. Our carpenters are trained to understand that a house is more than parts assembly. A building incorrectly conceived and executed can be expensive to maintain and harmful to live in and harmful to nature on which we depend. We value honesty and good relationships with our clients, helping our community and respect for nature.*

**Specialties:** *Building Design & Construction, Consultancy*

## **BuildingGreen, Inc.**

122 Birge St., Ste. 30  
Brattleboro, Vermont 05301  
802-257-7300  
jerelyn@buildinggreen.com  
www.buildinggreen.com

*BuildingGreen provides building industry professionals with well-researched information on environmentally sound building practices and green products. Online resources include BuildingGreen and LEEDuser.*

**Specialties:** *Alternative Energy, Beyond Energy, Building Design & Construction, Education, Energy Conservation*

## **BuildingLogic, Inc.**

PO Box 210  
Gardiner, New York 12525  
845-443-0657  
lillianmaurer210@gmail.com  
www.buildinglogicinc.com

*We design and build beautiful high performance homes. Our full service company integrates traditional craft, science, and modern design, to create durable efficient homes that people love to live in. Certified Passive House Consultant and Tradesperson, Net-Zero Energy design.*

**Specialties:** *Building Design & Construction, Energy Conservation, Net Zero Energy, Passive Housing, Remodeling/DER*

## **Built To Last Design & Build, LLC**

30 Greenwood Rd.  
New Milford, Connecticut 06776  
203-947-1196  
benjaminbogje@gmail.com

*Offering general contractor services.*

**Specialties:** *Building Design & Construction, Single Family*

## **Byggmeister, Inc.**

667A Sawmill Brook Pkwy.  
Newton, Massachusetts 02459  
617-527-7871  
info@byggmeister.com

*Byggmeister is a residential design/build remodeling firm founded in 1983. Our priorities for each project are comfort, durability, and efficiency and a unique level of accountability.*

**Specialties:** *Building Design & Construction, Remodeling/DER*



## C

### **CGH Architects**

49 South Pleasant St., Ste. 301  
Amherst, Massachusetts 01002  
413-549-3616  
info@candharchitects.com

www.candharchitects.com

*CGH Architects is a full service architectural practice designing residential, commercial, and institutional buildings for mission-driven public, non-profit, and private clients. We create transformative designs for a renewable future, making buildings that are loved in the region where we live. CGH: Design for the Next Hundred Years*

**Specialties:** Architecture, Energy Conservation, Remodeling/DER

### **Caliper Studio**

75 Scott Ave.  
Brooklyn, New York 11237  
718-302-2427  
info@caliperstudio.com

www.caliperstudio.com

*Caliper Studio is an integrated design office and metal fabrication shop located in Brooklyn, NY. Founded in 2003, Caliper offers both architectural services and custom metal fabrication to other architects, general contractors, and end users.*

**Specialties:** Architecture, Building Design & Construction, Design Process

### **Casaceli Construction, LLC**

55 West St.  
Northborough, Massachusetts 01532  
508-351-9400

michaelcasaceli@gmail.com

*Casaceli Construction, with over 30 years of experience, builds and remodels homes. Leveraging our experience, we are focusing on building in ways that are healthy for our clients and the Earth. Casaceli Construction has made a commitment to be a sustainable builder and remodeler and to pass the benefits on to our clients. With this commitment, we are offering deep energy retrofits and zero energy ready homes.*

**Specialties:** Building Design & Construction, Remodeling/DER

### **CED Greentech East**

1559 King St.  
Enfield, Connecticut 06082  
860-289-7711

solarteam@cedgreentecheast.com  
www.cedgreentecheast.com

*CED Greentech East serves East of the Mississippi in the ever-expanding solar industry. We work closely with installers and have both excellent service and extensive experience in the electrical and photovoltaic fields. Our goal is to meet your project requirements at a competitive price, and to manage and deliver your system in a timely and professional manner. Our stock of material and accessories will help complete your jobs without any holdups! Greentech personally handles daily deliveries throughout the region, ensuring that your complete system arrives on time and at no additional cost to you! We get low freight rates through our corporate account and your order will be shipped out same day!*

**Specialties:** Cities & Communities, Commercial & Institutional, Education, Energy Auditing, Energy Conservation, Lighting Design, Lighting Supply, Photovoltaics, Electrical

### **Celebration Green Design & Build**

20 Hamilton Dr.  
Madison, Connecticut 06443  
203-533-4689  
alicia@celebrationgreen.com  
www.celebrationgreen.com

*We combine our passion with our extensive knowledge & experience utilizing many types of energy efficient construction practices to design and build high performance homes, including passive house and zero net energy. We are also committed to spread the word and teach other stakeholder groups "why, what & how" building this way matters for our future. As part of this effort, we are proud to be founding members of 'CTPH' - Connecticut Passive House.*

**Specialties:** Building Design & Construction, Education, Marketing, Net Zero Energy, Passive Housing, The Big Picture

### **Celtic Energy, Inc.**

437 Naubuc Ave., Ste. 106  
Glastonbury, Connecticut 06033  
860-882-1515

wdonzila@celticenergy.com

www.celticenergy.com

*Celtic Energy is an independent consulting firm founded to help energy users and associated organizations maximize their cost reduction and productivity benefits in the ever-changing energy marketplace.*

**Specialties:** Alternative Energy, Beyond Energy

### **Center For EcoTechnology (CET)**

320 Riverside Dr., Ste. 1-A  
Florence, Massachusetts 01062  
413-586-7350

cet@cetonline.org

www.cetonline.org

*We help people and businesses save energy and reduce waste. For more than 40 years, we've offered proven advice and resources to save you money, make you more comfortable at home, and help your business perform better. Working with partners throughout the region, we're helping make our community a better place to live and work. We make green make sense.*

**Specialties:** Building Design & Construction, Commercial & Institutional, Composting, Consultancy, Design Process, Education, Energy Auditing, Energy Conservation, Insulation, Multifamily, Net Zero Energy, Renewables & The Grid, Single Family, The Big Picture, Wind, HERS Rater

### **Center For Sustainable Energy**

50 Milk St., 16th Fl.  
Boston, Massachusetts 02109  
857-243-2021

elizabeth.glynn@energycenter.org

www.energycenter.org

*A nonprofit social enterprise, CSE has facilitated 44,000 energy projects for consumers, businesses and governments. Through our market outreach and technical and policy expertise over 130,000 people have been directly served by our programs and CSE has a well-established reputation as a point of statewide and regional coordination among utilities, end-users, industry, regulators and local governments. Today, our reach is expanding nationally. Our areas of expertise include clean transportation, distributed generation, building performance, energy efficiency, energy storage and renewable energy. We work with energy policy makers, regulators, federal, state and local governments, utilities, public agencies and business.*

**Specialties:** Alternative Energy, Certifications & Standards, Commercial & Institutional, Consultancy, Education, The Big Picture

### **Centerbrook Architects and Planners, LLP**

67 Main St.  
Centerbrook, Connecticut 06409  
860-767-0175

coan@centerbrook.com

www.centerbrook.com

*Centerbrook has been a leading firm in the practice of green and sustainable design since the 1970s. These are essential components of all its projects.*

**Specialties:** Alternative Energy, Architecture, Biomass, Building Design & Construction, Commercial & Institutional, Design Process, Envelope & Enclosure

### **Chris Green, LLC**

36 Sawyer Hill Rd.  
New Milford, Connecticut 06776  
203-628-0539

greenchris@sbcglobal.net

www.patternsinwood.com

*A craftsman searching for good designs and artful solutions in residential construction.*

**Specialties:** Building Design & Construction, Single Family

### **Clark & Green Architects**

113 Bridge St.  
Great Barrington, Massachusetts 01230  
413-528-5180

info@clarkandgreen.com

www.clarkandgreen.com

*Clark & Green, Inc. is committed to meaningful architectural design. Since 1988, it has applied its design principles to a variety of building types. In addition to residential work, the firm has executed major commercial, institutional and municipal projects. These include the adaptive reuse of an historic building into a mixed-use, six-screen cinema and the conversion of an athletic field house into a multi-use theater complex. The firm relies on strong relationships with consultants supporting the special needs of each project. Collaboration enables Clark & Green to integrate quality design with complex engineering requirements.*

**Specialties:** Architecture

### **CLEARResult**

50 Washington St., Ste. 3000  
Westborough, Massachusetts 01581  
508-836-9500

cara.russell@clearesult.com

www.clearesult.com

*CLEARResult is the leading provider of energy efficiency programs and services. Our Building Performance Consulting and certification teams provide consultation and project management to advance high-performance buildings. We help owners and developers maximize performance and energy savings for commercial and residential buildings.*

**Specialties:** Consultancy, Consumer Information, Energy Conservation

### **Coastal Windows & Exteriors, Inc.**

100 Cummings Ctr., Ste. 236H  
Beverly, Massachusetts 01915  
978-304-0495

service@mycoastalwindows.com

*Doing Things the Right Way Turns Out to be a Great Way to Grow Your Business. David and Stephanie knew that a home improvement company run with a customer-first attitude could do well. They just didn't realize how well until they launched. When they started out, they only sold and installed windows, but customers love businesses that show them respect. As word got around people kept asking about other products and services and within several months they added doors, roofing and siding to meet the demand. Stephanie and David are more committed than ever to maintaining Coastal Windows & Exteriors as a truly exceptional company.*

**Specialties:** Remodeling/DER, Roofing, Windows

**Community Preservation Corporation (CPC)**

28 East 28th St., 9th Fl.  
New York, New York 10016  
212-869-5300  
ederry@communitycp.com  
www.communitycp.com

*As a leading nonprofit affordable housing and community revitalization finance company, we utilize our deep, strategic relationships to create customized loan opportunities for our customers. As a trusted partner in your success, we work hand-in-hand with you to help maximize the potential of your multifamily project and its impact on the community. One of the biggest barriers to pursuing energy efficiency can be restricted access to sufficient capital. In an attempt to cut both costs and carbon footprints, CPC has developed a financing methodology to catalyze integration of energy efficiency and water conservation measures into construction loans. This allows for a quality retrofit that locks in energy and water savings, helping to ensure long term economic stability of the property.*

**Specialties:** Finance/CPA, Money & Business, Multifamily, Real Estate, The Big Picture

**Connecticut Green Bank**

845 Brook St.  
Rocky Hill, Connecticut 06067  
303-459-7840  
craig.connolly@ctgreenbank.com  
www.ctgreenbank.com

*The Connecticut Green Bank is the nation's first green bank. We're creating a thriving marketplace to accelerate green energy adoption in Connecticut by making green energy financing accessible and affordable for homeowners, businesses and institutions. We partner with private-sector investors to create low-cost, long-term, sustainable financing to implement green energy measures in the residential, commercial, industrial, institutional and infrastructure sectors.*

**Specialties:** Finance/CPA, Photovoltaics, Solar Thermal

**Conservation Solutions Corporation**

162 Great Rd., Ste. 7  
Acton, Massachusetts 01720  
978-266-1900  
dcook@conservationsolutions.com  
www.conservationsolutions.com

*Since 1993 Conservation Solutions Corporation has provided our customers with creative solutions to energy and water problems in their facilities and buildings. We accomplish the energy and water savings while keeping people comfortable and satisfaction a priority. In industrial facilities we increase efficiency and improve production. We are acknowledged experts in electronic resonance water treatment, water filtration, heat recovery, metering, efficient lighting, plug load efficiency, steam system optimization, heating and cooling system efficiency improvements and creative project financing. We have a staff of dedicated experts available to troubleshooting problems and apply a line of proven and tested "state of the art" technologies.*

**Specialties:** Commercial & Institutional, Consultancy, Energy Conservation

**Consolidated Edison Company of New York, Inc. (Con Ed)**

100 Summit Lake Dr., Ste. 410  
Valhalla, New York 10595  
212-460-4771  
jimenezj@coned.com  
www.coned.com/energyefficiency

*Con Edison provides energy to 3.4 million customers in New York and Westchester County, New York. Newsweek recently named the company the 'Greenest' utility in the United States. To learn more about our energy-saving programs, visit [conEd.com/greenteam](http://conEd.com/greenteam).*

**Specialties:** Alternative Energy

**Cornerstone Architecture**

700 Richmond St., Ste. 110  
London, Ontario N6A 5C7  
519-432-6644  
cornerstone@cornerstonearchitecture.ca  
www.cornerstonearchitecture.ca

*Established in 1991, our firm has developed a wide range of experience in a variety of sectors from children's facilities to seniors' communities; as well as educational, administrative, healthcare, and community projects. Our clients include both public and private sector organizations, as well as not-for-profit groups and private individuals. As the leading firm in our region, we encourage all of our clients to consider opportunities for reducing the impact of their buildings on the environment.*

**Specialties:** Architecture

**Cosella-Dörken Products, Inc.**

4655 Delta Way  
Beamsville, Ontario L0R 1B4  
888-433-5824  
tkimmel@cosella-dorken.com  
www.cosella-dorken.com

*Cosella-Dörken delivers innovative, high-performance air and moisture barriers for commercial and residential construction sold under the DELTA® brand name. Building green involves the business of manufacturing. Therefore we do not manufacture products or by-products which can negatively impact our world. We are very sensitive to protecting our environment and the people who are in our employ, while producing high quality, sustainable products that will create healthier living environments.*

**Specialties:** Indoor Air Quality, Manufacturing

**Cotuit Solar, LLC**

3800 Falmouth Rd.  
Marstons Mills, Massachusetts 02648  
508-428-8442  
info@cotuitsolar.com  
www.cotuitsolar.com

*Solar thermal, photovoltaics, wind and wastewater alternative engineering, installation and service. In business since 1988.*

**Specialties:** Multifamily, Single Family, Mechanical Systems & Lighting, HVAC, Photovoltaics, Wind

**Crosby Real Estate**

100 Salem St., 035  
Smithfield, Rhode Island 02917  
617-563-8956  
shercrosby1984@yahoo.com  
www.crosbyhomesales.com

*Crosby Real Estate, Inc. will assist you and take the hassle out of buying or selling your home or piece of property. Crosby Real Estate specializes in homes and property in Henryetta and the surrounding area.*

**Specialties:** Real Estate, Single Family

**Crown Heights Jewish Community Council, Inc.**

387 Kingston Ave.  
Brooklyn, New York 11225  
718-771-9000  
mail@chjcc.org  
www.chcentral.org

*The CHJCC offers a wide range of programs to the Crown Heights community, including the Weatherization Assistance Program. The Weatherization Assistance Program (WAP) is a Federally-funded program for improving energy efficiency and lowering costs for owners of multi-family buildings or private homes. The program can upgrade heating systems, replace windows, insulate roofs and walls, and eliminate air infiltration - think of all the money you're spending that are literally going out the windows or the doors.*

**Specialties:** Social Services, The Big Picture

**D**

**Danish Cleantech Hub**

15 Metro Tech Center, Fl. 19  
Brooklyn, New York 11201  
453-377-3377  
jash@di.dk

*Danish Cleantech Hub is concerned with energy efficiency, climate adaptation and resiliency. We focus on areas where we see clear links between the specific needs of New York and the Danish strongholds.*

**Specialties:** Alternative Energy, Cities & Communities, Commercial & Institutional, The Big Picture



**R.H. Irving Homebuilders**

**Fossil Fuel Free  
High Performance Homes**

Zero Energy Modulars or Site-Built  
Deep Energy Retrofits  
High Performance Upgrades for existing homes

**Bob Irving Owner/Builder · Serving New Hampshire & Eastern Vermont**

603.648.2635 · [rhirvinghomebuilders.com](http://rhirvinghomebuilders.com) · [bob@rhirvinghomebuilders.com](mailto:bob@rhirvinghomebuilders.com)

**David Matero Architecture**

100 Front St., Ste. 40  
 Bath, Maine 04530  
 207-389-4278  
 david@davidmatero.com  
 www.davidmatero.com

*David Matero Architecture is a full service LEED AP architect specializing in residential, commercial, historic, green and restaurant architecture.*

**Specialties:** Architecture, Commercial & Institutional, Multifamily, Single Family

**David Murray Architect**

61 Church Hill Rd.  
 New Paltz, New York 12561  
 845-384-2265  
 davidmurrayarchitect@gmail.com  
 www.hudsonvalleyarchitect.com

*David Murray is a NYS licensed Architect based in New Paltz, New York. His practice consists of both Residential and Commercial projects in both Traditional and Contemporary Styles. The designs utilize Green strategies and products with super insulated, energy efficient design a priority. This is a small firm with great ideas and excellent client service.*

**Specialties:** Architecture, Commercial & Institutional, Net Zero Energy, Passive Housing, Single Family

**DEAP Energy Group, LLC**

667 Saw Mill Brook Pkwy.  
 Newton, Massachusetts 02459  
 617-775-4716  
 mduclos@deapgroup.com  
 www.deapgroup.com

*DEAP Energy Group provides comprehensive consulting services to improve the quality of life and energy efficiency of homes. Our work encompasses both new construction and existing home retrofits. We work on single-family homes, multi-family up to three stories, and small-scale commercial and institutional projects.*

**Specialties:** Building Design & Construction, Energy Conservation, Remodeling/DER

**Decumanus Green Design/Build, Inc.**

29 Edgewood Dr., Ste. 2  
 Lenox, Massachusetts 01240  
 413-281-0046  
 joseph@decumanusgreen.com  
 www.decumanusgreen.com

*Decumanus Green provides both design and construction services. Whether you are looking to build new or remodel, we can help you to visualize and realize a new home that fits within your budget. At Decumanus Green we strive to make all of our building practices as environmentally responsible as possible and our homes and additions as energy efficient as possible. We keep ourselves abreast of the constantly developing world of sustainable design and building.*

**Specialties:** Building Design & Construction, Design Process, Remodeling/DER, Single Family

**Demand Management Institute, Inc. (DMI)**

300 Chestnut St., Ste. 150  
 Needham, Massachusetts 02492  
 781-449-5700  
 info@dmiiinc.com  
 www.dmiinc.com

*DMI specializes in providing expert consulting and engineering services to improve energy efficiency and operation of commercial, industrial, institutional, and large-scale residential facilities. DMI has established itself as one of the most respected energy engineering firms in New England with unsurpassed attention to detail and quality.*

**Specialties:** Energy Auditing, Energy Conservation

**DeMetrick Housewrights**

201P Gravelly Hill Rd.  
 Wakefield, Rhode Island 01879  
 401-789-4712  
 sdemetrick@gmail.com  
 www.demetrickhousewrights.com

*DeMetrick Housewrights is a residential building company in Rhode Island that specializes in high-performance building, millwork, and high-end remodeling.*

**Specialties:** Building Design & Construction, Design Process, Net Zero Energy, Passive Housing, Remodeling/DER, Single Family

**Dietz & Company Architects, Inc.**

55 Frank B. Murray St., Ste. 201  
 Springfield, Massachusetts 01103  
 413-733-6798  
 office@dietzarch.com  
 www.dietzarch.com

*For over 30 years, Dietz & Company Architects has been serving the architectural needs of private and public institutions including the housing, education, healthcare, commercial, and historic preservation sectors. We are dedicated to interpreting our clients' ideas while building healthy, sustainable communities. We routinely design high performance buildings and implement a "best practice" approach for energy conservation and sustainable materials whenever it can be determined to be cost-effective for our clients. Our sustainable design achievements include two recently built affordable housing developments that are designed to be zero net energy.*

**Specialties:** Architecture, Commercial & Institutional, Multifamily, Single Family

**Dominic Paul Mercadante Architecture**

70 Waldo Ave.  
 Belfast, Maine 04915  
 207-338-4089  
 info@dpmercadante.com  
 www.dpmercadante.com

*With over 20 years of experience I bring creativity and attention to detail to my practice of residential architecture creating buildings that perform well environmentally, functionally, and aesthetically.*

**Specialties:** Architecture, Building Design & Construction, Consultancy

**Donnell Carpentry**

46 Hop Brook Rd.  
 Amherst, Massachusetts 01002  
 413-522-2051  
 ddonnell@crocker.com

**Specialties:** Building Design & Construction, Construction Process

**Dryvit Systems, Inc.**

1 Energy Way  
 West Warwick, Rhode Island 02893  
 401-822-4100  
 dean.balcirak@dryvit.com  
 www.dryvit.com

*As a global leader contributing to sustainable buildings, Dryvit Systems is committed to providing quality products and services while considering people, planet, and prosperity in all business decisions. We are recognized for developing the world's most energy efficient, architecturally diverse, insulated cladding systems and decorative finishes for vertical wall surfaces. Utilizing responsible chemistry and exceptional manufacturing processes, we conserve resources and minimize our environmental impact to support and enhance healthy, vibrant communities. With an engaged and empowered workforce, Dryvit embraces a sustainable culture and creates lasting value for our stakeholders.*

**Specialties:** Insulation, Manufacturing

**Duncan • Wisniewski Architecture**

255 South Champlain St.  
 Burlington, Vermont 05401  
 802-864-6693  
 michaelw@duncanwisniewski.com  
 www.duncanwisniewski.com

*Passive means PRO-actively designing structures that use less energy, last beyond a lifetime, and offer a sanctuary for the inhabitants. Duncan Wisniewski Architecture is committed to learning, teaching, and sharing passive design. Passive is a mindset placing value on the ecosystems and communities we inhabit at home and at work. Passive House is a performance building standard that sets a pretty high bar for low energy consumption. Simply put- we believe in designing good places that prosper, and we have adopted a design strategy focusing on a robust building envelope (passive) to minimize mechanical systems (active).*

**Specialties:** Architecture, Commercial & Institutional, Multifamily, Passive Housing, Single Family

**E****E2 Solar, Inc.**

831 Main St., Rte. 6A  
 Dennis, Massachusetts 02638  
 508-237-3892  
 jason@e2solarcapecod.com  
 www.e2solarcapecod.com

*In 2008, E2 Solar was established to deliver high quality photovoltaic systems to residents and businesses on Cape Cod and the South Shore. Since then E2 has installed over 100 MW of photovoltaic and numerous solar thermal systems on residences and businesses across southeastern Massachusetts. Jason Stoots and the entire staff at E2 Solar, Inc. is committed to designing and installing exceptionally efficient, low maintenance, long lasting solar energy systems. E2 offers SunPower PV modules with the highest efficiency now available (cell efficiencies over 20%). Talk with one of E2 Solar's qualified solar site analysts today.*

**Specialties:** Photovoltaics, Solar Thermal

**E4TheFuture**

10 Speen St.  
 Framingham, Massachusetts 01701  
 774-777-5121  
 info@e4thefuture.org  
 www.e4thefuture.org

*Bringing clean, efficient energy home for every American. E4 = energy, economy, equity, environment. E4TheFuture promotes residential clean energy and sustainable resource solutions to advance climate protection and economic fairness by influencing federal, state and local policies, and by helping to build a resilient and vibrant energy efficiency and clean energy sector. Follow us on Twitter @e4thefuture*

**Specialties:** Education, Energy Conservation, Public Policy



## eco\_logic STUDIO, architecture & engineering, PLLC

2495 Main St., Ste. 431  
Buffalo, New York 14214  
716-834-9588  
office@eco-logucstudio.com  
www.eco-logicstudio.com

*eco\_logic STUDIO is an architecture, engineering, and planning firm focusing on green design and community revitalization. Specializing in high performance new and retrofit design of custom homes, affordable housing, institutional facilities, commercial development, urban design and planning, and green infrastructure. Certified Passive House Designer, Architects, and Engineer on staff. Experience in natural building, solar systems and living roofs. Architectural registration in NY, NJ, MI, NC, SC, and CT.*

**Specialties:** Architecture, Building Design & Construction, Cities & Communities, Consultancy, Design Process, Engineering, Envelope & Enclosure, Insulation, Multifamily, Net Zero Energy, Passive Housing, Roofing, Single Family

## Eco-Logical Building Solutions

27 Frost Hill Rd.  
Marlborough, New Hampshire 03455  
603-876-4040

ted@ecologicalbuildingsolutions.com  
www.ecologicalbuildingsolutions.com

*Eco-Logical Building Solutions is a Green Building Design, Consulting and Project Management Company. We specialize in implementing sustainable, energy efficient, environmentally friendly building and lifestyle practices that minimize waste of all resources. We strive to provide each customer with a wholly cooperative and personal experience. Whether you are building new, expanding, or remodeling an existing building we want to work with you to come up with eco-logical and cost effective solutions to your building needs.*

**Specialties:** Consultancy, Design Process, Remodeling/DER, Single Family

## Element Marcom

31 St., James Ave., 6th FL.  
Boston, Massachusetts 02116  
212-920-4878  
adixon@element.link

*Our mission is to tell the stories of small, medium and large companies focused on energy efficiency and sustainability. By telling our clients' stories, we seek to raise their visibility among target audiences and drive new business. We work to position our clients as thought leaders in their industry, ultimately increasing brand awareness and interest from potential customers. By identifying core differentiating elements, we create compelling narratives that cut through the noise and capture people's attention. Starting with strategy and focusing on the business impact, our services consist of strategic messaging, content marketing, media relations, executive visibility, event marketing, award submissions, internal communications, global implementation and digital outreach.*

**Specialties:** Commercial & Institutional, Marketing

## Embue

745 Atlantic Ave.  
Boston, Massachusetts 02110  
617-314-6260  
info@embue.com  
www.embue.com

*Our Mission: To make apartment building operations more efficient, comfortable, and cost-effective. Our goal is the intelligent building that automates management tasks, optimizes resource use, and protects against loss, while providing a healthy comfortable environment tailored to residents' individual needs. With thoughtful application of technology we aim to transform multifamily portfolio, property management and resident experience in all segments of market. Embue was created by a group of engineers and entrepreneurs that are obsessive about making apartments work better so that you can worry less and enjoy more. Our team is highly engaged in creating what it means to live in, manage or own a smart apartment.*

**Specialties:** Commercial & Institutional, Energy Conservation, Multifamily, Information Technology

## Emerald Builders

PO Box 299  
Bowdoinham, Maine 04008  
207-841-2775  
reggie@emeraldbuild.com  
www.emeraldbuild.com

*Emerald Builders is a residential building company serving mid-coast Maine. We focus primarily on building sustainable and energy efficient homes and buildings. We work closely with our clients, designers, and subcontractors to bring their dreams to reality. We rely heavily on open communication between all parties from conception through project completion to make sure we've put out the best possible product for our clients. We pride ourselves on an unwavering commitment to the highest quality craftsmanship and to the environment.*

**Specialties:** Alternative Energy, Building Design & Construction, Construction Process

## Energy Balance, Inc.

160 White Rock Dr., #1  
Montpelier, Vermont 05602  
802-229-5676  
andy@energybalance.us

**Specialties:** Building Design & Construction, Consultancy, Envelope & Enclosure, Multifamily, Net Zero Energy, Single Family

## Energy Co-op of Vermont

PO Box 111  
Colchester, Vermont 05446  
802-860-4090  
info@ecvt.net  
www.ecvt.net

*The Energy Co-op of Vermont was launched in September 2000 and began accepting members for the first time in July 2001. This historic event was the culmination of two years work in which we completed our business plan, established low-income energy bill management programs, researched co-op operations, acquired the Miller Oil Company, and completed other start-up tasks. Today, we deliver heating oil, kerosene and wood pellets and provide heating system maintenance, repairs and replacement for 2,000 members. We install super-efficient, cold-climate heat pumps, offer energy audits and energy upgrades for our members' homes.*

**Specialties:** Cities & Communities, Energy Auditing, Single Family

## Energy Emporium

78 Main St.  
NH, Connecticut 03748  
603-632-1263  
info@energyemp.com  
www.energyemp.com

*The Energy Emporium is a showroom, information center and full service sales, installation and support for solar electric systems, solar hot water, wind and water turbines.*

**Specialties:** Photovoltaics, Solar Thermal, Wind

## Energy Engineering and Design, Inc.

65 Main St.  
Framingham, Massachusetts 01702  
781-775-2698  
info@energyengineeringinc.com  
www.energyengineeringinc.com

*EE&D has the ability to develop a customized facility improvement program that fits your individual needs in the most cost effective way.*

**Specialties:** Certifications & Standards, Commercial & Institutional, Energy Auditing

## Energy Federation, Inc. (EFI)

40 Washington St., Ste. 2000  
Westborough, Massachusetts 01581  
508-870-2277  
joconnell@efi.org  
www.efi.org

*For over 30 years, EFI has assisted people in their efforts to use less energy and water by providing energy efficient products and delivering successful utility program services. Our mission is to encourage people to use our planet's limited energy and water resources wisely. We assist people in these efforts by offering high quality conservation products and services at affordable prices while communicating practical, objective information. By following this mission, our work will lead to an improved quality of life and economic condition. EFI a leading promoter of residential energy efficiency-related products, distributing products directly through our Consumer and Wholesale Divisions, and administering utility-sponsored rebate programs through our Incentive Processing Division.*

**Specialties:** Building Design & Construction

## Energy Futures Group

PO Box 587  
Hinesburg, Vermont 05461  
802-482-5001  
info@energyfuturesgroup.com  
www.energyfuturesgroup.com

*EFG is a consulting firm that provides clients specialized expertise on energy efficiency markets, programs and policies, with an emphasis on cutting-edge approaches. It was founded in April 2010 by Chris Neme, Richard Faesy, and Glenn Reed, each of whom has more than 20 years of experience in the energy efficiency industry. EFG has worked with a range of clients – government agencies, consumer advocates, environmental advocates and utilities – in 24 states, 3 Canadian provinces, and several countries in Europe.*

**Specialties:** Consultancy, Public Policy

### Energy Investment Systems

125 Maiden Ln., Rm. 505  
New York, New York 10038  
212-966-6641  
eis@eisincorp.com  
www.eisincorp.com

*When building owners contemplate a major improvement program, it is the time to consider all of the energy performance opportunities available. EIS works with each client building to consider the highest performing and most appropriate energy equipment available, to review the configuration of the building's supply and generation of energy, and to integrate energy systems with user information technology. EIS works closely with its clients to develop custom improvement packages that maximize operating cost reductions and program incentives to offset capital costs. We produce long-term improvement packages with lifetime savings that can be several times the cost of the improvements. We assist clients to structure low-cost financing that keeps the project in the black from day one.*

**Specialties:** Money & Business, Multifamily

### Energy Management Professionals, LLC

PO Box 2127  
Waterbury, Connecticut 06722  
203-756-7041  
wwesson@wessonenergy.com  
www.wessonenergy.com

*Energy Management Professionals, LLC (previously Wesson Energy) is a progressive energy partner specializing in modern, high-efficiency solutions and comprehensive home comfort service. We help homeowners and businesses integrate alternative energy sources, including solar and biofuel.*

**Specialties:** HVAC, Mechanical Systems & Lighting, Multifamily, Single Family

### Energy Opportunities, Inc.

1200 East Camping Area Rd.  
Wellsville, Pennsylvania 17365  
717-292-2636  
sheffer@sevengroup.com  
www.sevengroup.com

*Energy Opportunities provides services focused on energy issues and the interface of nature and human enterprises. Founded in 1993, EO is also a part of 7group, LLC.*

**Specialties:** Alternative Energy, Architecture, Beyond Energy, Building Design & Construction, Certifications & Standards, Commercial & Institutional, Composting, Construction Process, Consultancy, Design Process, Education, Energy Auditing, Energy Conservation, Engineering, Envelope & Enclosure, HVAC, Indoor Air Quality, Insulation, Lighting Design, Multifamily, Net Zero Energy, Passive Housing, Pavement, Photovoltaics, Renewables & The Grid, Research, Roofing, Solar Thermal, The Big Picture, Wind, Windows

### Enviro Power, LLC

114 Mansfield Hollow Rd.  
Mansfield Center, Connecticut 06250  
860-942-8100  
info@enviropowertec.com  
www.enviropowertec.com

*Enviropower Technologies creating combined heat and power solutions utilizing Smartwatt technology achieving over 90% efficiencies.*

**Specialties:** Alternative Energy, Manufacturing

### European Architectural Supply (EAS)

144 North Rd., Ste. 2500  
Sudbury, Massachusetts 01776  
617-647-4432  
pmuzila@eas-usa.com  
www.eas-usa.com

*Supplier of high-quality Passive House certified windows, doors and curtain wall from Schuco and Makrowin. Products include entry doors, tilt-turn windows, lift-slide doors and are available in PVC, wood, aluminum, and commercial curtain wall.*

**Specialties:** Envelope & Enclosure, Net Zero Energy, Passive Housing, Windows

### EvB Design

1310 Broadway, Ste. 200  
Somerville, Massachusetts 02144  
617-623-2222  
edrick@evbdesign.com  
www.evbdesign.com

*EvB Design provides architectural services for custom designed energy efficient housing, from single family to multi-family housing.*

**Specialties:** Architecture

## F

### Fine Homebuilding

63 S Main St.  
Newtown, Connecticut 06470  
800-926-8776  
fh@taunton.com  
www.finehomebuilding.com

*Fine Home Building provides expert home construction tips, tool reviews, remodeling design and layout ideas, house project plans, and advice for homeowners.*

**Specialties:** Building Design & Construction, Design Process, Education, Single Family

### Fitch Architecture & Community Design

110 Pulpit Hill Rd.  
Amherst, Massachusetts 01002  
413-549-5799  
info@fcdarchitects.com  
www.fcdarchitects.com

*Fitch Architecture & Community Design offers a full range of services emphasizing ecologically sound and socially responsible design. Our work ranges from deep energy retrofits and zero net energy buildings to cohousing communities and other smart-growth projects. Our interactive approach allows us to realize your vision with practical, innovative, and cost-effective solutions. Skilled in group process facilitation and active listening, we build consensus within families, communities, and building committees. We have received numerous awards for green design and smart growth development, are internationally recognized for our expertise in cohousing, and were named one of the Top Ten Green Architects for 2005 by Natural Home and Garden magazine.*

**Specialties:** Architecture, Commercial & Institutional, Multifamily, Net Zero Energy, Remodeling/DER

### Foard Panel, Inc.

PO Box 185  
West Chesterfield, New Hampshire 03466  
800-644-8885  
pete@foardpanel.com  
www.foardpanel.com

*Foard Panel manufactures and installs structural insulated panels for residential and commercial construction.*

**Specialties:** Building Design & Construction, Insulation, Manufacturing



Garland Mill Timberframes  
273 Garland Road Lancaster, NH 03584  
tele/fax 603.788.2619 www.garlandmill.com

## High-Performance Homes

## Fred Davis Corporation

120 North Meadows Rd., Ste. 3  
Medfield, Massachusetts 02052  
800-497-2970  
info@freddaviscorp.com  
www.freddaviscorp.com

*Fred Davis Corporation is a leading independent nationwide wholesale distributor dealing exclusively with energy efficient lighting products since 1983. Our company was founded by Fred Davis, who made his start in the energy conservation field during the "Energy Crisis" of the mid-1970s. He enjoys sharing his knowledge as a speaker at conferences, as well as writing The Lightening Volt, our occasional newsletter on the latest in energy efficient lighting. Whether you are looking for LED screw-ins at the best possible price or for advice on what type of lighting fixture is best for an application, Fred Davis Corporation is your one-stop supplier.*

**Specialties:** Lighting Supply

## Futuro Construction

371A Islington St.  
Portsmouth, New Hampshire 03801  
603-294-4222  
matt@futuroconstruction.com  
www.futuroconstruction.com

*Futuro: Seacoast NH and Southern Maine's go-to source for Zero Energy Homes and Green Construction.*

**Specialties:** Construction Process, Net Zero Energy, Single Family

## G

### Garland Mill Timberframes

273 Garland Rd.  
Lancaster, New Hampshire 03584  
603-788-2619  
mail@garlandmill.com  
www.garlandmill.com

*Garland Mill is a small family-owned business, specializing in the design and construction of heavy timber framed structures and high performance homes. Garland Mill has designed and built a variety of super-insulated buildings over the last 14 years. Net Zero has become a particular sweet spot, but we are excited to pursue any building project that integrates exceptional energy performance with beautiful and durable craftsmanship. While the heart of our business is the design and construction of high performing buildings, the soul of our business resides in our old water powered sawmill that has been in continuous operation since 1856. We use the mill to saw the timber and lumber we use in our homes. When not sawing, the mill's micro hydro-electric generator produces clean energy.*

**Specialties:** Building Design & Construction, Design Process, Net Zero Energy, Passive Housing, Solar Thermal

### Geoffrey H. Richon Company, Inc.

19 Duncan St.  
Gloucester, Massachusetts 01930  
978-283-6063  
info@ghrichon.com  
www.ghrichon.com

*The Geoffrey H. Richon Company specializes in delivering high quality construction, remodeling, and consulting services to Cape Ann and Essex County. Our experience is based on over 35 years in residential construction and remodeling. Through a whole-system approach to design and construction, we provide our clients with a high level of energy efficiency, comfort and durability for their projects.*

**Specialties:** Building Design & Construction, Consultancy, Envelope & Enclosure, Net Zero Energy, Passive Housing, Remodeling/DER, Single Family

## George Penniman Architects, LLC

35 Pratt St., Unit 202  
Essex, Connecticut 06426  
860-767-2822  
george@pennimanarchitects.com  
www.pennimanarchitects.com

*George Penniman Architects LLC is a full-service, client oriented firm working on large and small scale residential projects, as well as small commercial and institutional projects throughout New England. Our work is characterized by its contextual nature, high performance building practices and environmental stewardship. George Penniman is a Certified Passive House Designer/Consultant and LEED for Homes professional.*

**Specialties:** Architecture, Building Design & Construction, Commercial & Institutional, Design Process, Landscape Design, Multifamily, Passive Housing, Single Family

## GO Logic, LLC

137 High St., 3rd Fl.  
Belfast, Maine 04915  
207-338-1566  
matt@gologic.us  
www.gologic.us

*We create carefully designed, highly energy-efficient, Passive-House-standard buildings. GO Logic is pleased to announce the launch of the GO Home—a breakthrough product line of high-performance, high-design prefab houses—and thegohome.us, a new website that makes the full line easily available to homebuyers anywhere in New England.*

**Specialties:** Passive Housing, Single Family

## Godfrey Design-Build

14 Roundy St., #2  
Beverly, Massachusetts 01915  
978-473-0987  
pat@godfreydesign-build.com  
www.godfreydesign-build.com

*Godfrey Design-Build is a full-service remodeling company serving the North Shore of Massachusetts. Our process allows clients to hire one company for all their design, scope development and construction services.*

**Specialties:** Building Design & Construction, Design Process, Remodeling/DER

## Good Energy Construction

197B E Central St.  
Natick, Massachusetts 01760  
508-653-0510  
john@goodenergyconstruction.com  
www.goodenergyconstruction.com

*Good Energy Construction brings together Boston's top design and construction talent to create beautiful, healthy, comfortable spaces. We build thoughtful and resilient spaces.*

**Specialties:** Building Design & Construction, Commercial & Institutional, Construction Process, Multifamily, Single Family

## Gotham 360

48 Wall St., 5th Fl.  
New York, New York 10005  
917-338-1023  
jkearney@gotham360.com  
www.gotham360.com

*Our energy management and consulting solutions transcend conventional service providers. We are trusted advisors and facilitators with the resources to execute proven energy management strategies. Gotham 360 provides the relevant energy consulting expertise you need with an individualized approach that works with your energy sustainability and procurement goals. Our team provides a number of services including: Energy Procurement, Demand Response Enablement, Data Management and Reporting, Auditing and Rate Analysis, Energy Efficiency, Distributed Energy Solutions - CHP, Solar, Storage, Fuel Cell, Sustainability Management*

**Specialties:** Consultancy, Energy Auditing, Energy Conservation, Engineering, Finance/CPA, Lighting Design, Multifamily, Photovoltaics, Real Estate, Solar Thermal

## Green Mountain College / Griswold Library

1 Brennan Cir.  
Poultney, Vermont 05764  
802-287-8303  
millettep@greenmtn.edu  
www.greenmtn.edu

*Green Mountain College prepares students for fulfilling lives by taking the goal of creating just and sustainable societies as the unifying theme for its interdisciplinary graduate and undergraduate liberal arts education. The College fosters the ideals of environmental and personal responsibility, civic engagement, entrepreneurial spirit, and global understanding.*

**Specialties:** Education

## Green River Architecture

11 Hickory Hill Rd.  
Great Barrington, Massachusetts 01230  
413-528-1108  
grarchitecture@me.com

*The art of building always is an act of renovation; even the unbuilt landscape provides a context which requires understanding, acknowledgment and respect. Meaning in modern architecture resides in the successful synthesis of ideas about place and tradition.*

**Specialties:** Architecture, Building Design & Construction, Energy Conservation, Envelope & Enclosure, Insulation, Multifamily, Net Zero Energy, Passive Housing, Remodeling/DER, Single Family

## H

### H2O Degree-Global Water & Energy Solutions

3580 Progress Dr., Ste. L  
Bensalem, Pennsylvania 19020  
215-788-8485  
info@h2odegree.com  
www.h2odegree.com

*H2O Degree uses a wireless based technology to monitor, control, and quantify utility consumption in multifamily buildings. We provide sub-metering solutions for electric and hydronic heating and cooling, as well as toilet leak detection.*

**Specialties:** Energy Conservation, Energy Auditing, Education



**Hardwick Post & Beam**

272 Fleming Rd.  
 Hardwick, Massachusetts 01037  
 413-426-6315  
 contact@hardwickpostandbeam.com  
 www.hardwickpostandbeam.com

*We are a company of craftspeople. For 33 years we have designed and built beautiful, custom, timber frame structures for clients in Massachusetts, New England, and across the United States. A family company in its second generation of leadership, we have been employing a group of timber framers year-round for more than three decades, and are committed to our people. We are very eager to work with architects and builders who are in the front line of cutting edge energy sustainability and who want to pair their product with the beauty and tradition of a timber frame. Our bottom line is designing and fabricating one frame at a time, bringing all of our resources, passion and experience to delivering the perfect timber frame for each specific client, site, and budget - every time.*

**Specialties:** Building Design & Construction, Construction Process, Design Process

**Healthy Home Energy & Consulting, Inc.**

200 Tomahawk St.  
 Yorktown Heights, New York 10598  
 914-242-9733  
 info@gethealthyhome.com  
 www.gethealthyhome.com

*A leading provider of Home Performance Services in the Tri-State Area, Healthy Home Energy and Consulting is on a mission. For too long, homeowners have been putting up with cold, damp, and inefficient homes. As a sister company to Brenner Builders, our 25 years of experience in residential construction makes us well suited to diagnose, recommend, and implement whole house energy savings solutions. Our own employees use top of the line products and cutting edge equipment, providing you with the highest quality standards possible. We arrive on time, when we say we will, and leave your home neat and tidy when we leave.*

**Specialties:** Consultancy, Indoor Air Quality

**Heartwood Group, Inc.**

165 Evergreen St.  
 Providence, Rhode Island 02906  
 401-861-1650  
 info@heartwoodsolutions.com  
 www.heartwoodsolutions.com

*Our company was founded in 1983 to create environmentally responsible buildings. Today we provide consulting and development services in the renewable energy and building industries.*

**Specialties:** Alternative Energy, Beyond Energy, Consultancy, Energy Conservation, Money & Business, Photovoltaics, Real Estate, Renewables & The Grid, The Big Picture, Wind

**Heat-Timer Corporation**

20 New Dutch Ln.  
 Fairfield, New Jersey 07004  
 973-575-4004  
 apetruziello@heat-timer.com  
 www.heat-timer.com

*Heat-Timer is one of the leading manufacturers of automated heating controls for the HVAC/R and Plumbing Industry. At Heat-Timer, our goal is to provide innovative, cost effective control solutions that enhance the comfort and efficiency of new and existing buildings. In doing so, we reduce the environmental impact of building heating systems worldwide- often within the imperfect framework of existing mechanical systems. For over 75 years, Heat-Timer products have been manufactured in the United States. The diversity of Heat-Timer controls, as well as their extraordinary fine-tuning capability, means improved performance of virtually any building's heating system- old or new, large or small, steam or hydronic.*

**Specialties:** Commercial & Institutional, Energy Conservation, HVAC, Manufacturing

**HELM Construction Solutions**

61 Upper Forest St.  
 Brattleboro, Vermont 05301  
 802-225-8933  
 kate@buildhelm.com  
 www.buildhelm.com

*At HELM, we work with owners, designers and builders to create high performance and sustainable buildings and businesses. HELM provides a range of innovative services to help your business and your projects run smoothly and efficiently. We're here to help support your business in whatever way you need, by offering expertise in business planning, accounting, estimating, job costing, project management, hiring, technology, software, and marketing that is specific to the high performance design and construction industry and the small business world.*

**Specialties:** Building Design & Construction, Construction Process, Consultancy

**Heritage Natural Finishes, LLC**

P.O. Box 307  
 Escalante, Utah 84726  
 541-844-8748  
 info@heritagenaturalfinishes.com  
 www.heritagenaturalfinishes.com

*We are Heritage Natural Finishes, our business name was formerly Land Ark Northwest and we called our products Land Ark. We have all the same great finishes and excellent customer service you are used to, just under a new name! We pride ourselves in making and selling the wonderful products famous for it. We are committed to keeping our products safe for those who work with them and especially for those who live with them in their home. We use all super high quality, non-toxic ingredients and try to run an environmentally sustainable office and shop. We recycle nearly everything and try to choose packaging that is recycled, fully recyclable or at least re-usable. We are nearly paperless and are always working to find a better and softer footprint for our business.*

**Specialties:** Manufacturing

**Home Energy Technologies**

PO Box 364  
 Chester, Connecticut 06412  
 877-800-6440  
 info@homeenergytechnologies.com  
 www.homeenergytechnologies.com

*Home Energy Technologies is a RESNET- accredited Home Energy Rating System Provider. Our services include HERS ratings, ENERGY STAR & NGBS certification, comprehensive home energy audits, building performance testing, and other energy diagnostic and analytical services. Our clients include architects, builders, and owners of single-family and multi-family homes in Connecticut and adjoining areas.*

**Specialties:** Consultancy, Energy Auditing, Energy Conservation

**Home Matters Company**

15 Indian Field Dr.  
 South Dennis, Massachusetts 02660  
 508-237-4615  
 barry@hmcapecod.com  
 www.homematterscapecod.com

*Home Matters is all about client advocacy and attention to detail because your home does matter! We know that detail done well takes time, effort, and expertise. Our focus is to thoughtfully manage each property as though it were our own.*

**Specialties:** Building Design & Construction, Single Family

**Huber Engineered Woods**

10925 David Taylor Dr., Ste. 300  
 Charlotte, North Carolina 28262  
 704-548-5443  
 beth.blount@huber.com  
 www.huberwood.com

*Huber Engineered Woods LLC continually strives to create innovative products that suit their customers' needs. Each one delivers outstanding performance, easy installation and greater strength in single family, multifamily and light commercial projects. Huber's ZIP System Sheathing & Tape are structural wood panels with built-in protective barriers, eliminating the need for building wrap or felt and providing a continuous rigid moisture and air barrier that optimizes energy efficiency. Additionally, Huber's AdvanTech Subflooring product is proven to achieve a superior combination of strength and moisture resistance for subflooring that won't swell, cup, delaminate or bounce even under the toughest conditions.*

**Specialties:** Insulation, Manufacturing, Roofing

**Hudson River Design**

120 Lighthouse Dr.  
 Saugerties, New York 12477  
 845-246-0725  
 chuck@chucksilver.com  
 www.chucksilver.com

*Hudson River Design has been designing low energy-use and net-zero homes in NY's Hudson Valley for over 30 years. We create extraordinary buildings, including the Greenest Building in NY.*

**Specialties:** Building Design & Construction

## Hudson Valley Community College

80 Vandenberg Ave., Ste. 1  
Troy, New York 12180  
518-629-7075  
s.schiffer@hvcc.edu  
www.hvcc.edu

Hudson Valley Community College's Malta facility, TEC-SMART, stands for Training and Education Center for Semiconductor Manufacturing and Alternative and Renewable Technologies. TEC-SMART serves as a community resource for demonstrating energy efficient design and building techniques and ties into several of the College's education and training programs. Incorporating green building techniques, as well as passive solar design in construction it achieved US Green Building Council's LEED platinum certification in 2011.

**Specialties:** Commercial & Institutional, Education, Money & Business

## Hudson Valley Preservation

29 Route 37 Center  
Sherman, Connecticut 06784  
860-355-0906  
dlangley@hvccorp.com  
www.hvpcorp.com

Formed in 1991, HVP has become one of the foremost companies for historic and modern renovations in the Hudson Valley and Connecticut. We also offer historic preservation consulting expertise in the areas of architectural history and assessment, preservation planning, restoration and rehabilitation design, and grant writing.

**Specialties:** Building Design & Construction, Construction Process, Design Process

## ICON Architecture, Inc.

101 Summer St., 5th Fl.  
Boston, Massachusetts 02110  
617-451-3333  
info@iconarch.com  
www.iconarch.com

ICON is a design firm motivated by a belief in design's ability to positively transform, empower and restore. We delight in the process, enriched by collaboration and a commitment to ongoing dialogue and discovery. We champion innovative environments that strengthen connections to people and place, fortify communities and create enduring value. Our work integrates intelligent design and construction methods with high performance and passive strategies to reduce energy demand and improve comfort and performance. Our commitment to sustainable design, smart growth and resilience creates healthy communities that restore our environment.

**Specialties:** Architecture, Commercial & Institutional

## In Posse

1500 Walnut St., Ste. 1414  
Philadelphia, Pennsylvania 19102  
215-282-6800  
info@in-posse.com  
www.in-posse.com

In Posse provides consulting and engineering design services for high performance, deep green projects with a special expertise in net-zero energy. At In Posse, we focus exclusively on the energy and sustainable design sectors of the built environment for clients in a broad range of market sectors. Our services address all aspects of building performance including modeling and analysis of building systems, engineering high performance building systems, commissioning and occupant education and engagement. In Posse is a subsidiary of AKF Group and is headquartered in Philadelphia, PA with an office in New York, NY.

**Specialties:** Consultancy, Energy Conservation, Engineering

## Infrared Diagnostic, LLC

9 Elaine Rd.  
Sudbury, Massachusetts 01776  
978-440-9900

info@infrareddiagnostic.com  
www.infrareddiagnostic.com  
Infrared energy audit, Duct Blaster and Blower Door testing. Certified Infrared Thermographer, HERS Rater. Provide consulting to builders, home owners on how to reduce energy consumption. Stretch Code and 2012 IECC consulting.

**Specialties:** Consumer Information, Energy Auditing, Energy Conservation, HVAC, Insulation, Roofing, Single Family, Electrical

## InSoFast, LLC

PO Box 1225  
Mitchell, South Dakota 57301  
484-668-1414  
info@insofast.com  
www.insofast.com

InSoFast, LLC, since 2006, manufactures single component continuous insulation panel. This panel combines do-it-yourself simplicity with cutting edge performance. InSoFast is an engineered alternative to the complex, multi-part conventional field assembled systems. InSoFast's R-10 continuous panel performs like a continuous insulated membrane that incorporates dual rainscreen layers and 16" o.c. framing. The non-conductive studs are covered with a 1/2" of foam to eliminate the thermal short circuits that plague traditionally installed sidings. With millions of square feet in place and thousands of happy customers, why work so hard just to do it right, when you don't have to?

**Specialties:** Building Design & Construction, Commercial & Institutional, Construction Process, Energy Auditing, Energy Conservation, Envelope & Enclosure, Indoor Air Quality, Insulation, Manufacturing, Multifamily, Net Zero Energy, Passive Housing, Remodeling/DER, Research, Single Family

## Integral Building & Design, Inc.

231 Main St., Ste. 103  
New Paltz, New York 12561  
845-255-0418  
pasquale@integralbuilding.com  
www.integralbuilding.com

Integral Building & Design, Inc. is an independent and locally-based team of building performance professionals committed to energy efficiency and sustainability. Specializing in high performance building and deep-energy retrofits, we provide building professionals and homeowners with resources and experience to achieve maximum home performance. We believe that buildings should be safe, affordable, and made to last generations.

**Specialties:** Alternative Energy, Beyond Energy, Building Design & Construction, Certifications & Standards, Construction Process, Consultancy, Design Process, Education, Energy Auditing, Energy Conservation, Envelope & Enclosure, Geothermal, HVAC, Indoor Air Quality, Insulation, Mechanical Systems & Lighting, Multifamily, Net Zero Energy, Passive Housing, Remodeling/DER, Renewables & The Grid, Research, Single Family, HERS Rater

## Integrata Architecture + Construction

419 Palmer Ave., Ste. 200  
Falmouth, Massachusetts 02540  
508-495-6575  
info@integrata-ac.com

www.integrata-ac.com  
INTEGRATA is an architecture and construction company based in Falmouth, MA serving the greater New England area. From site development to material selection, all our work is guided by sustainable design and construction practices.

**Specialties:** Architecture, Single Family, Multifamily, Commercial & Institutional, Design Process, Building Design & Construction

## Integrated Eco Strategy

85 Main St., Ste. 212  
North Adams, Massachusetts 01247  
413-884-2571  
charley@integratedecostrategy.com  
www.integratedecostrategy.com

Integrated Eco Strategy supports project teams as they pursue the most challenging green building design standards. IES provides: Integrative design consulting to plan high-performing and healthy buildings, building material research via our proprietary healthy materials database Red2Green, green building certification consulting, Living Building Challenge & LEED. Goals our clients have include creating a healthier indoor environment to promote well-being and increased productivity; smaller energy bills and their associated carbon footprint; Net-Zero Energy; LBC certification – full living or petal certification. We work with clients ranging from billion-dollar thought leaders to grassroots advocates for justice. Give us a call; we'd like to hear about your green building goals.

**Specialties:** Building Design & Construction, Commercial & Institutional, Consultancy

## Integrated Solar Applications Corporation

121 Spring Tree Rd.  
Brattleboro, Vermont 05301  
802-257-7493  
info@isasolar.com  
www.isasolar.com

We specialize in the design, service & installation of renewable energy systems, including solar thermal hydronic, photovoltaic, small wind, micro-hydro, biomass & hybrid systems.

**Specialties:** Multifamily, Single Family, Mechanical Systems & Lighting, HVAC

## J

### Jack Miller Contractors, Inc.

158 Sand Springs Rd.  
Williamstown, Massachusetts 01267  
413-884-6124  
info@jackmillercontractors.com

www.jackmillercontractors.com

*Residential Contractors specializing in high-performance homes and remodeling. We're a full-service general contractor experienced in a variety of construction and energy retrofit strategies, including ICF, double-stud wall and exterior insulation, air, thermal and water management strategies and mechanical systems. Our goal is to combine traditional craftsmanship with high performance materials and techniques to achieve the holy grail of beauty, durability and performance for our clients.*

**Specialties:** Building Design & Construction, Remodeling/DER

### Jim Muka, Window Sales

139 Silvio O Conte Dr.  
Greenfield, Massachusetts 01301  
413-774-6975  
jimmuka212@gmail.com

*Independent window and door sales representative. Over 36 years of experience in the residential and commercial window and door industry. Providing direct sales of both high performance fiberglass and specialty clad/wood and all wood windows and doors. Alpen Fiberglass Window and Door Direct Sales Representative. Builder and Architect direct price quotes, budget pricing, product service. Homeowner direct sales/service.*

**Specialties:** Windows

### John Fülöp Associates, Architects and Planners

103 East Alford Rd.  
West Stockbridge, Massachusetts 01266  
413-232-7122  
john@fulopassociates.com

www.fulopassociates.com

*John Fülöp Associates, Architects provides design services for all building types, creating aesthetically pleasing, economic green architecture throughout the Northeast.*

**Specialties:** Building Design & Construction, Energy Conservation, Remodeling/DER

### Johnson Braund, Inc.

15200 52nd Ave. South, Ste. 200  
Seattle, Washington 98188  
206-766-8300  
info@gethealthyhome.com

www.johnsonbraund.com

*Since 1977, Johnson Braund, Inc. has designed thousands of top quality projects from coast to coast. We provide architecture and interior design services throughout the United States. What began as a handful of architects designing multifamily housing has grown into a company offering much more. From class leading hotels, comfortable homes, to attractive businesses, and lush green parks, we forge ahead, breaking new ground every day. We aim to bring to our designs some of the most sustainable designs and techniques in the industry. From programming and feasibility studies, to schematic design, through construction management, we are the firm for award winning design solutions that are on time and on budget.*

**Specialties:** Architecture

### Jones Whitsett Architects, Inc.

308 Main St., Ste. 3A  
Greenfield, Massachusetts 01301  
413-773-5551  
office@joneswhitsett.com  
www.joneswhitsett.com

*Formed in 1984, we specialize in schools, civic/cultural buildings & historic preservation. We share a commitment to a collaborative design process, respect for the architectural traditions of our region & concern for future generations.*

**Specialties:** Architecture, Building Design & Construction

## K

### Kaplan Thompson Architects

102 Exchange St. 2nd Fl.  
Portland, Maine 04101  
207-842-2888  
info@kaplanthompson.com  
www.kaplanthompson.com

*Our mission is to bring beautiful, sustainable, and attainable buildings to the world. From your home to your business, we can design the sustainable building you have been looking for.*

**Specialties:** Architecture, Multifamily, Net Zero Energy, Passive Housing, Remodeling/DER, Single Family

### Kent Hicks Construction Company

634 Main Rd.  
West Chesterfield, Massachusetts 01084  
413-296-0123  
janet@kenthicksconstruction.com  
www.kenthicksconstruction.com

*Our clients often want both high quality and low environmental impact as they build, renovate, or restore their home. They want to reduce energy costs, achieve greater energy independence, and protect their health from toxic chemicals. Whether you want to make your own energy, invest for long-term energy security, live in a 'healthy' home, or protect the environment, we have the experience to help you choose the best design and materials for your high-performance green home. We know the full range of products, construction materials, and building processes at all levels. Our team has experience with contractors who can provide a full range of systems for efficient heating, cooling and ventilation, and for generating your own energy.*

**Specialties:** Building Design & Construction, Remodeling/DER

### Klepper, Hahn & Hyatt

5710 Commons Park Dr.  
East Syracuse, New York 13057  
315-446-9201  
jad@khphpc.com  
www.khphpc.com

*Klepper, Hahn & Hyatt is a multi-disciplinary design firm specializing in structural engineering, landscape architecture, and building envelope systems. We serve the northeastern United States from our office in Central New York. Our firm works in both the public and private sectors to develop projects which are cost-effective, sustainable, and responsive to the needs of our clients.*

**Specialties:** Building Design & Construction, Commercial & Institutional, Construction Process, Consultancy, Design Process, Education, Energy Conservation, Engineering, Home Inspection, Landscape Design, Multifamily, Pavement, Roofing, Wind

### Kolbert Building

90 Gray St.  
Portland, Maine 04102  
207-799-8799  
dan@kolbertbuilding.com  
www.kolbertbuilding.com

*We focus on bringing energy efficiency and healthy home techniques to all of our work, from small renovations to complete new houses. We are active members of NESEA, and run a local building science discussion group.*

**Specialties:** Building Design & Construction, Consultancy, Remodeling/DER

### KOW Building Consultants

1034 West Jericho Tpke.  
Smithtown, New York 11787  
631-757-5000  
kevinw@kowbc.com  
www.kowbc.com

*KOW Building Consultants has been a trusted provider of construction consulting services since 1978. We add value to traditional banks, private lenders, mortgage lending institutions, state housing agencies, city housing agencies, mezzanine lenders, and other financial institutions by providing construction loan monitoring, property condition assessment, and technical plan & cost reviews.*

**Specialties:** Consultancy, Finance/CPA

## L

### LAM Development

139 W. 82nd St., 6C  
New York, New York 10024  
212-321-0965  
support@lamdevelopment.com  
www.lamdevelopment.com

*LAM Development is New York State's premier solar developer. Our primary focus is to bring cost-saving renewable power to local municipalities and businesses, enabling communities of all sizes to attain energy security and reduce their energy expenditures. We accomplish this by leveraging our vast network of partnerships with utilities, construction firms, and real estate companies to quickly and efficiently meet the needs of our clients.*

**Specialties:** Alternative Energy

### Landmark Services, Inc.

326 Washington St. Anx.  
Wellesley Hills, Massachusetts 02481  
508-533-8393  
info@landmarkservices.com  
www.landmarkservices.com

*Landmark Services, Inc. specializes in renovating and restoring period homes. We also build new, energy efficient homes inspired by traditional architecture. We believe that saving old homes can and should be a key part of any sustainable housing strategy in New England and beyond. Building Zero Net Energy/Renewable new homes aligns with the principals' lifelong passion for fostering and supporting sustainable innovation. We believe that it is our highest calling as builders and citizens to be conscious, compassionate stewards of the natural world. Wherever we can we support people and businesses that share this mission.*

**Specialties:** Building Design & Construction, Construction Process, Net Zero Energy, Remodeling/DER, Single Family



**Lassel Architects PA**

370 Main St.  
South Berwick, Maine 03908  
207-384-2049  
info@lasselarchitects.com  
www.lasselarchitects.com

*Lassel Architects PA is an architectural and planning firm founded in 1989. We have been designing sustainable and energy efficient structures for over 20 years. The firm provides a broad range of services with experience in a variety of project types. All members of our design team are LEED Accredited Professionals and one is also a Building Performance Institute (BPI) Certified Building Analyst. Our portfolio of work includes renovation and new construction projects, in commercial, institutional, health care, retail, multi-family housing and unique single family residences of various sizes and budgets. We treat all of our projects, be they small or large, with the same care and thought to achieve our clients' goals.*

**Specialties:** Architecture, Commercial & Institutional, Multifamily, Single Family

**Lewis Creek Builders**

909 Long Point Rd.  
North Ferrisburgh, Vermont 05473  
802-999-6942  
mark@lewiscreekbuilders.com  
www.lewiscreekcompany.com

*Our Company has four integrated divisions: Design, Build, Energy, and Education. We offer traditional design/build residential services which are coupled with expertise in renewable energy, high performance homes, and passive house construction. What makes us special is our whole systems approach which includes not just the built environment but the education of the public and homeowners in matters related to sustainability and generative living.*

**Specialties:** Building Design & Construction, Education, Energy Conservation

**Luthin Associates, Inc.**

535 Main St.  
Allenhurst, New Jersey 07711  
732-774-0005  
info@luthin.com  
www.luthin.com

*At Luthin Associates we draw upon our robust industry experience to provide a unique perspective and innovative solutions for our clients. Luthin Associates provides a wide array of energy consulting services to all of the industry sectors predominately in the New York tristate area. We currently conduct business in New York, New Jersey, Connecticut, Pennsylvania, and Massachusetts. In addition, we are also licensed to conduct business in Maryland and Illinois.*

**Specialties:** Alternative Energy, Commercial & Institutional, Consultancy

**M**

**M.G. Kane Properties, Inc.**

162 Pond St.  
Ashland, Massachusetts 01721  
508-881-8882  
mg.kane@verizon.net  
www.mgkaneproperties.com

*M.G. Kane Properties specializes in building "Net Zero Energy Attainable" homes.*

**Specialties:** Real Estate

**M.J. Moran, Inc.**

4 South Main St.  
Haydenville, Massachusetts 01039  
413-268-7251  
info@mjmoraninc.com  
www.mjmoraninc.com

*The M.J. Moran Company was formed in February of 1978, and has steadily grown in size since then. Our repeat customers include Top Flite/Callaway Golf, Milton Bradley, Suddekor, Smith College, Mount Holyoke College, Amherst College, Eaglebrook School, Northfield Mount Hermon, and the Cooley Dickinson Hospital, just to name a few. As Mechanical Construction Manager, we work closely with the Architect, Engineers, and Owner, providing our expertise in value costing, budgeting and scheduling. Project Services include: Plumbing, HVAC Systems, Process Piping Systems, High Pressure Gas & Steam Systems, Medical Gas Systems, Design/Build Services, Mechanical Construction Management.*

**Specialties:** Building Design & Construction, Commercial & Institutional, Construction Process, Design Process, Engineering, HVAC, Multifamily, Single Family

**Maclay Architects**

4509 Main St.  
Waitsfield, Vermont 05673  
802-496-4004  
wmap@maclayarchitects.com  
www.maclayarchitects.com

*Maclay Architects specializes in ecological planning and architecture, healthy building design, micro-load and net zero building design and received the 2012 NESEA Zero Net Energy Building Award. The firm's project portfolio includes ten LEED Gold or Platinum certified buildings, and ten net zero or net zero ready institutional and commercial projects. Bill Maclay and Maclay Architects authored a book titled: *The New Net Zero: Leading-Edge Design and Construction of Homes and Buildings for a Renewable Energy Future*, by Chelsea Green Publishing. Bill Maclay, AIA, LEED-AP, and founding principal of Maclay Architects, has been recognized as a leader in innovative, healthy, and ecological planning and architectural design since 1971.*

**Specialties:** Architecture, Building Design & Construction, Commercial & Institutional, Education, Energy Conservation, Envelope & Enclosure, Multifamily, Net Zero Energy, Remodeling/DER, Single Family

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on campus and at home

**c&h architects**  
candharchitects.com amherst, ma.

**Maine Passive House, LLC**

278 Rowe Hill Rd.  
Greenwood, Maine 04255  
207-890-3203  
jesper@mainepassivehouse.com  
www.mainepassivehouse.com/welcome.html  
*Maine Passive House is a green building and design company. We can custom build new houses, remodel or restore your existing home, and help with design, to create a beautiful, comfortable, healthy, and energy efficient home. Being green isn't just about using the correct light bulbs or flooring, but actually understanding what we're doing and why it makes sense. Our strengths lie in our knowledge of the science of building, our meticulous planning and organization, and our high quality custom woodworking and cabinetry. Having built everything from ski chalets and residential homes to agricultural timber framed structures to renovating historical buildings we have since 1996, developed a network of reliable and trustworthy sub contractors who take as much pride in their work as we do.*

**Specialties:** Alternative Energy, Building Design & Construction, Design Process, Passive Housing, Remodeling/DER, Single Family

**Maple Hill Architects**

55 Glezen Ln.  
Wayland, Massachusetts 01778  
508-358-1615  
doug@maplehillarchitects.com  
www.maplehillarchitects.com  
*Maple Hill Architects is a full service design firm specializing in green design work in a variety of project types including educational, religious, and residential.*

**Specialties:** Building Design & Construction

**Mary Kraus Architect**

110 Pulpit Hill Rd.  
Amherst, Massachusetts 01002  
413-549-5799  
mary@marykrausarchitect.com  
www.marykrausarchitect.com  
*Making decisions in a group can be challenging. A compassionate, skilled facilitator makes all the difference, holding a safe space in which participants feel emboldened to speak their truth; in which active listening builds community and connection while embracing diverse views; and from which emerge satisfying solutions that integrate the varied needs of all participants. Over 25 years as a consulting cohousing architect, I have applied these skills to participatory design workshops, through which future neighbors work together to define their visions and design their communities. These same facilitation principles are valuable to any group (non-profit, business, municipal, etc.) engaging in decision-making or seeking greater understanding between members.*

**Specialties:** Architecture, Multifamily

**Maryann Thompson Architects**

741 Mt. Auburn St.  
Watertown, Massachusetts 02472  
617-744-5187  
maryann@maryanntompson.com  
www.maryanntompson.com  
*Maryann Thompson Architects is a Cambridge-based architecture firm that offers a wide range of services to public and private clients. We specialize in architecture that is sustainable, regionally driven and that attempts to heighten the phenomenological qualities of the site in which we work. Our architectural investigations revolve around such concerns as the creation of a rich and thoughtful edge between inside and outside, utilizing light as a medium, and employing warm, natural materials in order to accentuate a sense of place. The firm's staff of 15 comes from diverse backgrounds, including architecture, landscape architecture, green architecture, planning, interior design and the visual arts.*

**Specialties:** Architecture, Landscape Design

**Mason Library, Keene State College**

229 Main St.  
Keene, New Hampshire 03435  
603-358-2711  
hilary.croteau@keene.edu  
www.keene.edu/academics/library  
**Specialties:** Education

**Massachusetts Audubon Society**

208 South Great Rd.  
Lincoln, Massachusetts 01773  
781-259-2112  
bpoor@massaudubon.org  
www.massaudubon.org  
*Mass Audubon works to protect the nature of Massachusetts for people and wildlife. Together with more than 100,000 members, we care for 35,000 acres of conservation land, provide school, camp, and other educational programs for 225,000 children and adults annually, and advocate for sound environmental policies at local, state, and federal levels. Founded in 1896 by two inspirational women who were committed to the protection of birds, Mass Audubon is now one of the largest and most prominent conservation organizations in New England. Today we are respected for our sound science, successful advocacy, and innovative approaches to connecting people and nature.*

**Specialties:** Consumer Information, Education, Public Policy

**Massachusetts Clean Energy Center (Mass CEC)**

63 Franklin St., 3rd Fl.  
Boston, Massachusetts 02110  
617-315-9355  
info@masscec.com  
www.masscec.com  
*The Massachusetts Clean Energy Center (MassCEC) is dedicated to accelerating the success of clean energy technologies, companies, and projects in Massachusetts—while creating high-quality jobs and long-term economic growth for the people of Massachusetts.*

**Specialties:** Consumer Information, Education, Energy Conservation, Public Policy

**McCauley Lyman, LLC**

10 Speen St.  
Framingham, Massachusetts 01701  
508-665-5801  
inquiries@mccauleylyman.com  
www.mccauleylyman.com  
*McCauley Lyman is a corporate and commercial law firm with a heavy emphasis on clean energy technology. Its lawyers are highly experienced and excel in all aspects of renewables development, finance, construction, operation, acquisition, and sales.*

**Specialties:** Commercial & Institutional, Construction Process, Consultancy, Finance/CPA, Public Policy, Real Estate

**Mighty Roots**

13 Alden Ave.  
Greenland, New Hampshire 03840  
603-319-8095  
e.okeefe@mightyroots.com  
www.mightyroots.com  
*Mighty Roots is a residential design-build company focusing on healthy, durable, and energy efficient new homes and renovation/addition projects.*

**Specialties:** Building Design & Construction

**Mindel and Morse Builders, LLC**

PO Box 643  
Brattleboro, Vermont 05302  
802-254-6662  
info@mindelandmorse.com  
www.mindelandmorse.com  
*Mindel and Morse Builders provides clients in the Brattleboro, VT, area with beautiful, comfortable, and efficient homes – be it a new construction or renovation project. Ever since Steve Mindel and Jonathan Morse teamed up over thirty years ago, our focus has been to reach high energy efficiency. We continuously adapt new discoveries from building science and work with our clients to find the best solutions for their individual projects.*

**Specialties:** Building Design & Construction, Construction Process, Net Zero Energy, Remodeling/DER, Single Family



## Bryan G. Hobbs Remodeling Contractor

Blown Cellulose Insulation • Spray Foam Insulation  
Airsealing • Energy Audits • Replacement Doors & Windows

Email: bryanhobbsremodeling@gmail.com

Telephone: 413-775-9006  
Cell: 413-522-2894  
Lic # 083982 • Reg # 139564

Bryan G. Hobbs  
346 Conway St.  
Greenfield, MA 01301



## Mitsubishi Electric Heating & Cooling

150 Cordaville Rd., Ste. 110  
Southborough, Massachusetts 01772  
978-988-5771  
rwillett@hvac.mea.com  
www.mitsubishielectric-usa.com

For more than 90 years, Mitsubishi Electric has made changes for the better through its energy-efficient products and technologies. These include factory automation equipment, automotive equipment, escalators, elevators, heating and cooling products, commercial hand dryers, large-scale video displays for stadiums and arenas, uninterruptible power supplies, solar panels, semiconductors, display walls, photographic and thermal printers, and electric utility products.

**Specialties:** HVAC, Mechanical Systems & Lighting, Energy Conservation

## Moneca Kaiser Design Build

254 Columbus Ave.  
Ottawa, Ontario K1K 1P6  
613-745-6627  
moneca@mkdb.ca  
www.mkdb.ca

From your initial vision right through to the finishing touches, we will see you all the way home. MKDB is a full-service design & build team located in the city of Ottawa. We provide a single point of responsibility and seamlessly integrated in-house design, renovation and building services to see you all the way home.

**Specialties:** Building Design & Construction

## Mulberry Tree Builders, LLC

24 Old Amherst Rd.  
Mont Vernon, New Hampshire 03057  
603-801-6938  
mulberrytreetbuilders@gmail.com  
www.mulberrytreetbuilders.com

Mulberry Tree Builders has been a leader in high performance architectural design and construction since 1981. We achieved Passivhaus infiltration standards in 1988, in a modest Cape in Standish, Maine, employing Canadian Double Walled building techniques. We are now one of 150 firms in the US to have earned Passive House Certified Builders status. We are currently working closely w/ some of the top building science firms in the Northeast, in an effort to build on these early ground breaking accomplishments. Our hope is to collaborate w/ our clients to construct attractive, comfortable and environmentally resilient homes and business venues in Southern NH, Northeastern Mass, Greater Portland, and the Hollowell/Augusta, areas of Maine.

**Specialties:** Building Design & Construction, Consultancy, Remodeling/DER

## N

### N Sabella Inc.

393 Central St.  
Framingham, Massachusetts 01701  
617 462 0179  
nick@nsbuildersma.com  
www.nsabella.com

Uncommon dedication to service and craftsmanship. We are a full service, design-build firm specializing in residential remodeling. From renovations to additions, historical homes to contemporary, our experienced, licensed employees are dedicated to superior quality. N Sabella proudly serves Metrowest Boston. Our streamlined process keeps your project plans on budget, reduces design errors while completing your project on time.

**Specialties:** Remodeling/DER, Single Family

## National Grid

40 Sylvan Rd  
Waltham, Massachusetts 02451  
315-481-4285  
jackie.vando@nationalgrid.com  
www.nationalgridus.com

We are one of the largest investor-owned energy companies in the world - covering Massachusetts, New York, Rhode Island and the UK. We are at the heart of one of the greatest challenges facing our society—delivering clean energy to support our world long into the future. Every day we work with stakeholders to promote the development and implementation of sustainable, innovative and affordable energy solutions. We are proud of the contributions our work and our people make to the prosperity and wellbeing of our customers, communities and investors.

**Specialties:** Cities & Communities, Commercial & Institutional, Consumer Information, Electric/Hybrid Vehicles, Energy Conservation, HVAC, Lighting Design, Multifamily, Net Zero Energy, Photovoltaics, Renewables & The Grid

## Neighborhood Housing Services of

### New Haven, Inc.

333 Sherman Ave.  
New Haven, Connecticut 06511  
203-562-0598  
kfay@nhsofnewhaven.org  
www.nhsofnewhaven.org

Neighborhood Housing Services of New Haven was incorporated in 1979 with a mission to revitalize selected neighborhoods in New Haven. Over time, our mission has evolved to focus on positioning New Haven's neighborhoods to succeed by increasing homeownership; making homes beautiful, energy-efficient, and affordable; and helping residents take charge of their neighborhoods. We believe that increased owner-occupancy rates, educated homebuyers, and rehabilitated houses will produce stable, revitalized neighborhoods that our clients will be proud to call home. During the course of our 35-year history, NHS has fully renovated and sold nearly 450 units to low- and moderate-income families.

**Specialties:** Social Services, Remodeling/DER

## Nelson Architech GmbH

Rigistrasse 33  
Cham/Switzerland 06330  
info@nelsonarchitech.ch  
www.nelsonarchitech.com/en

Our services exceed the simple design of buildings. At Nelson Architech we view architecture holistically and in relations to the living habits of its occupants. This way we create sustainable solutions that not just influence the design but also the surrounding environment.

**Specialties:** Architecture, Design Process

## Net Zero Builders

36 Wildberry Ln.  
Turner, Maine 04282  
207-713-9090  
admin@netzero.builders  
www.netzero.builders

There are many builders, developers and designers who sell similar concepts and brands. Our company has a long history and background in the modular industry. We have taken what we have learned over the last 25+ years about the modular home manufacturing industry to the next level. As a group we have spent a long time strongly focusing on what drives the building cost/cost per square foot and have learned how to control it. We then developed a system that stream lines the very labor intensive building process while still providing a high level of custom finishes and options. Our system applies to stick built, post frame and modular construction projects.

**Specialties:** Building Design & Construction, Net Zero Energy, Single Family

## New Ecology, Inc.

15 Court Sq. Ste. 420  
Boston, Massachusetts 02108  
617-557-1700  
info@newecology.org  
www.newecology.org

The mission of New Ecology, Inc. is to catalyze sustainable development and bring its benefits to under-served populations, and to maintain a focus on acting locally to address global environmental issues. We work in many areas of community-based sustainable development, but we devote most of our efforts to green affordable housing. Our focus is on the practical and cost-effective: making new and existing buildings efficient, durable, and healthy.

**Specialties:** Building Design & Construction, Certifications & Standards, Construction Process, Consultancy, Design Process, Education, Energy Auditing, Energy Conservation, Engineering, Envelope & Enclosure, Multifamily, Passive Housing

## New Energy Works Timberframers

1180 Commercial Dr.  
Farmington, New York 14425  
800-486-0661  
joinery@newenergyworks.com  
www.newenergyworks.com

Thirty years ago we started New Energy Works Timberframing, a small timber frame company. Today, along with our sister company, Pioneer Millworks, we employ over 120 designers, timberwrights, engineers, craftspeople, and community members. Together, we design and build some of the most lyrical and efficient timber frames in the industry, using reclaimed timbers, energy efficient enclosure systems, environmentally responsible practices, and state-of-the-art technology and software.

**Specialties:** Architecture, Building Design & Construction, Commercial & Institutional, Envelope & Enclosure, Multifamily, Net Zero Energy, Single Family



### **New Frameworks**

1 Mill St., Ste. 163  
Burlington, Vermont 05401  
802-917-4059  
info@newframeworks.com  
www.newframeworks.com

*New Frameworks is a full-service contracting, consultation, and education company specializing in the integration of natural materials and technologies and high-performance building systems. We are passionate about working in healthy environments and creating positive relationships to build structures that are truly sustainable. We enjoy working directly alongside clients in both design and construction, and firmly believe in the importance of social justice and skills access to enable people of all creeds and economic backgrounds access to safe, beautiful, and affordable shelter.*

**Specialties:** Building Design & Construction, Consultancy, Education, Energy Auditing, Envelope & Enclosure, Indoor Air Quality, Insulation, Net Zero Energy, Passive Housing, Remodeling/DER

### **New York State Energy Research and Development Authority (NYSERDA)**

17 Columbia Cir.  
Albany, New York 12203  
518-862-1090  
info@nysesda.ny.gov  
www.nysesda.ny.gov

*NYSERDA offers objective information and analysis, innovative programs, technical expertise, and funding to help New York businesses and residents increase energy efficiency, save money, use renewable energy, and reduce their reliance on fossil fuels.*

**Specialties:** Consultancy

### **Next Phase Studios, Inc.**

344 Boylston St.  
Boston, Massachusetts 02116  
617-375-9300  
info@nps-architects.com  
www.nps-architects.com

*Next Phase Studios Architects is a collaborative design firm providing full design services for architecture and interiors. We work as an experienced, integrated team and use a dynamic, problem solving approach. As both individuals, and studio members, we strive for a very high level of expertise and effectiveness. This method leads to creative, sustainable, innovative design, building technology, and well managed Project Delivery.*

**Specialties:** Architecture

### **Noble Home, LLC**

PO Box 476  
Shelburne Falls, Massachusetts 01370  
413-623-3733  
info@noble-home.net  
www.noble-home.net

*The modern, all natural, affordable home. The Noble Home is a house kit designed for each building site, easily assembled by an owner-builder.*

**Specialties:** Alternative Energy, Beyond Energy, Building Design & Construction, Design Process, Research, Single Family

### **North River Architecture & Planning, PC**

3650 Main St.  
Stone Ridge, New York 12484  
845-687-6242  
stephanie@nriverarchitecture.com  
www.nriverarchitecture.com

*Stephanie Bassler and Peter Reynolds, co-founders of North River Architecture & Planning have worked together since 2006. During their collaboration, their many and diverse completed design projects in the Hudson Valley and beyond are distinguished by their energy efficiency, and their sensitivity to local context and to the community and client's highest achievable goals. As Principal of NRAP, Stephanie pursues projects with a strong best-practices approach to sustainability, efficiency, and integration of whole systems design. As Senior Designer, Peter draws on over 25 years of experience with architectural, interior design, master planning, and space planning services that integrate North River's design values with clients' diverse needs over a broad range of project scales.*

**Specialties:** Architecture, Building Design & Construction, Multifamily, Single Family

### **Northeast Sustainable Energy Association (NESEA)**

50 Miles St.  
Greenfield, Massachusetts 01301  
413-774-6051  
nesea@nesea.org  
www.nesea.org

*Founded in 1974, the Northeast Sustainable Energy Association (NESEA) is the region's leading membership organization helping high-performance building and energy efficiency professionals improve their practices by learning from and networking with each other. We, as professionals in the fields of renewable energy and building, embrace whole systems thinking as the path to sustainability.*

**Specialties:** The Big Picture

### **Northern Manhattan Improvement Corporation (NMIC)**

45 Wadsworth Ave., 8th Fl.  
New York, New York 10033  
212-822-8300  
danriber@nmic.org  
www.nmic.org

*NMIC has been providing Weatherization Services for over 30 years. If you have a multi-family building in Manhattan we can help you reduce your heating/hot water costs. We have helped dozens of buildings save as much as 35%. NMIC is BPI certified with cumulative staff experience of over 100 years in the energy conservation and retrofit industry.*

**Specialties:** Energy Auditing, Energy Conservation, HVAC, Mechanical Systems & Lighting, Multifamily, Single Family

### **Noveda Technologies**

1200 US-22, Ste. 2000  
Bridgewater, New Jersey 08807  
908-685-6448  
info@noveda.com  
www.noveda.com

*Noveda Technologies is the award-winning global leader in real-time, Web-based monitoring for conventional and renewable energy systems. Our products and services enable you to lower energy costs, reduce carbon footprint and enhance occupant comfort in you.*

**Specialties:** Alternative Energy, Consumer Information, Energy Conservation, Information Technology

### **NS Builders**

8 Tuckerman St., Unit B  
Boston, Massachusetts 02127  
617-799-7521  
nick@nsbuildersma.com  
www.designbuildrepeat.com

*Design should follow function and be smart and strong. We believe it should also be innovative and forward thinking, and NS Builders prides itself on being just that. Hand-crafted, One of a kind. We build with our hands, our hearts, and our minds. Precision and attention to detail is what we here at NS Builders are all about. The only way to be the best at something is to work hard at it. With 15 years in the business, NS Builders has the skills and expertise to turn your dreams into a reality.*

**Specialties:** Building Design & Construction, Single Family

## **O**

### **October Engineering, LLC**

16 October Rd.  
Sudbury, Massachusetts 01776  
508-561-7553  
rlm@octoberengineering.com  
www.octoberengineering.com

*October Engineering offers project development services for energy service performance contracts (ESPC), energy management systems (EMS) design and specification, heating, ventilating and air conditioning (HVAC) energy analysis and design and residential HVAC design. See [octoberengineering.com](http://octoberengineering.com) for details and work samples.*

**Specialties:** Alternative Energy, Energy Auditing, Engineering, HVAC, Mechanical Systems & Lighting, Net Zero Energy, Remodeling/DER

## **P**

### **Partners For Architecture, Inc.**

48 Union St., Bldg. 1  
Stamford, Connecticut 06906  
203-708-0047  
studio@pfarch.net  
www.pfarch.net

*After a combined 75 years of working for many successful organizations, Partners For Architecture Inc. was inaugurated in 1999 with the dedication to establish an architectural firm that provides comprehensive and environmentally sensitive architectural services.*

**Specialties:** Architecture, Building Design & Construction, Energy Conservation

### **Pavers By Ideal**

45 Power Rd.  
Westford, Massachusetts 01886  
978-692-3076  
info@idealconcreteblock.com  
www.idealconcreteblock.com

*Ideal manufactures a full line of interlocking concrete pavers and retaining wall systems. Products include Eco-Stone, Aqua-Bric, and Turfstone, environmentally friendly, permeable pavers. Pavers by Ideal offers a GREEN solution.*

**Specialties:** Landscape Design, Pavement

## Performance Building Supply

111 Fox St.  
Portland, Maine 04101  
207-780-1500  
info@performancebuildingsupply.com  
www.performancebuildingsupply.com  
*Performance Building Supply provides construction products and information to make buildings high performing, energy efficient, durable, resilient, healthy, and more comfortable for the occupants. Every product we offer is thoroughly researched and chosen based on energy performance, environmental, and health effects, manufacturing process and location, durability, and practical use.*  
**Specialties:** Envelope & Enclosure, HVAC, Indoor Air Quality, Windows

## Petersen Engineering, Inc.

335 Maplewood Ave.  
Portsmouth, New Hampshire 03802  
603-436-4233  
info@petersenengineering.com  
www.petersenengineering.com  
*Petersen Engineering provides green consulting services in the areas of HVAC, plumbing, fire protection and building envelope for commercial, residential and industrial buildings.*  
**Specialties:** Commercial & Institutional, Consultancy, Engineering, Envelope & Enclosure, HVAC, Multifamily, Single Family

## Peterson Engineering Group

25 Van Zant St., Ste. 7D  
Norwalk, Connecticut 06855  
203-810-4191  
info@peg-eng.com  
www.peg-eng.com  
*Peterson Engineering Group, LLC has been open since 2008. All employees have multiple years experience in consulting engineering for MEP & FP trades. The team has worked on projects from hotels to marinas & airports. PEG takes part in the energy efficiency incentive program. PEG pays special attention to energy efficiency savings as well as operational & maintenance issues. PEG deals with these issues early in the design stage rather than at the end of the project to ensure a successful lifetime of the building. The principal of PEG is Mr. Donald C. Peterson, PE. He has been in the consulting engineering trade for the past twenty years. Mr. Peterson is a LEED AP with certifications in Energy Management, Commissioning & a Green Building Engineer on Department of Energy Star site.*  
**Specialties:** Consultancy, Engineering

## Philips Lighting Electronics North America

200 Franklin Square Dr.  
Somerset, New Jersey 08873  
207-332-3831  
charles.polas@philips.com  
www.usa.lighting.philips.com/home  
*As leaders in the LED technology revolution, we create lighting systems that prioritize energy efficiency, sustainability, and operational cost reduction. We focus on improving the livability and effectiveness of indoor and outdoor environments, providing everything from functional general illumination to spectacular color-changing experiences that enhance your brand, encourage social interactions, and revitalize communities.*  
**Specialties:** Commercial & Institutional, Lighting Design, Lighting Supply, Manufacturing, Multifamily

## phME [passivhausMAINE]

139 South Freeport Rd.  
Freeport, Maine 04032  
207-710-9478  
info@passivhausmaine.org  
www.passivhausmaine.org  
*We build and design extremely energy efficient buildings. As a Certified Passive House Consultant, we do energy calculations using the PHPP software.*  
**Specialties:** Certifications & Standards, Multifamily, Passive Housing, Single Family

## Pill-Maharam Architects

53 Falls Rd.  
Shelburne, Vermont 05482  
802-735-1286  
dpill@pillmaharam.com  
www.pillmaharam.com  
*Pill-Maharam Architects, founded in 1991 by David Pill offers comprehensive architectural services for institutional, commercial and residential clients. With hands on experience in the construction field, our staff brings to each project a realistic body of knowledge to create a buildable innovative solution. We are continually doing research into and incorporating sustainable strategies so that our finished projects are environmentally responsible. We fuse creative ideas with functional, budgetary and programmatic requirements to create finely detailed sculptural spaces and buildings.*  
**Specialties:** Architecture, Building Design & Construction, Commercial & Institutional, Construction Process, Consultancy, Design Process, Electric/Hybrid Vehicles, Energy Conservation, Envelope & Enclosure, Geothermal, Mechanical Systems & Lighting, Net Zero Energy, Passive Housing, Photovoltaics, Single Family, Windows

## Pioneer Millworks

1180 Commercial Dr.  
Farmington, New York 14425  
800-951-9663  
jennifer@pioneermillworks.com  
www.pioneermillworks.com  
*We provide reclaimed timbers to timber frame companies, including our sister company, New Energy Works Timberframers, design professionals, fine builders, and residential customers across the nation. This outdoor living space in Oregon showcases as-found industrial salvaged timbers, one of many available grades.*  
**Specialties:** Building Design & Construction

## Pioneer Valley Habitat for Humanity

140 Pine St., Ste. 9  
Florence, Massachusetts 01062  
413-586-5430  
admin@pvhabitat.org  
www.pvhabitat.org  
*Since 1989, Pioneer Valley Habitat for Humanity has built decent, affordable homes with 37 low income families in Hampshire and Franklin Counties. We build our homes with volunteer labor and donations of material, supplies, land, and services.*  
**Specialties:** Building Design & Construction, Energy Conservation, Single Family, Social Services

## Placetaylor, Inc.

51 Heath St.  
Boston, Massachusetts 02130  
617-639-0633  
staff@placetaylor.com  
www.placetaylor.com  
*Placetaylor-made projects are always built to the highest efficiency possible with a particular eye toward comfort. Where a well placed window captures the sun's energy to heat a house, a heat recovery ventilator streams fresh winter air into a room without bringing in the winter temperature. We keep heat when we want it and get rid of it when we don't.*  
**Specialties:** Building Design & Construction

## Preservation of Affordable Housing (POAH)

40 Court St., Ste. 700  
Boston, Massachusetts 02108  
617-449-1017  
info@poah.org  
www.poah.org  
*Preservation of Affordable Housing (POAH) is a nonprofit developer, owner and operator of nearly 9,000 affordable homes in 9 states and the District of Columbia. Our mission is to create, preserve and sustain affordable, healthy communities that provide economic security and access to opportunity for all people. At POAH we recognize that managing the environmental footprint of our properties is a critical piece of our preservation mission. POAH has committed to both The Big Reach and Better Buildings Challenge, national programs with a target of reducing portfolio wide energy and water consumption but 20% by 2020. Our green initiatives weave throughout POAH activities and impact development, operations, and property management practices.*  
**Specialties:** Building Design & Construction, Construction Process, Design Process, Energy Conservation, Envelope & Enclosure, Finance/CPA, Indoor Air Quality, Multifamily, Net Zero Energy, Real Estate, Social Services

## PV Squared Solar

311 Wells St., Ste. B  
Greenfield, Massachusetts 01301  
413-772-8788  
info@pvsquared.coop  
www.pvsquared.coop  
*PV Squared is proud to be one of the longest standing renewable energy specialists in the Pioneer Valley and Western New England. Since our founding in 2002, we have worked to deliver projects that go above and beyond, both in terms of energy production and financial performance, and in terms of thoughtfulness and attention to detail. Our structure as a worker-owned cooperative means we're able to offer the benefit of working with an owner of the business through every phase of your project, and that we're invested in the long term happiness of our clients, the livelihood of our workers, and the health of our community. Our customer-focused approach has built a reputation for quality and service that is second to none. If you're interested in talking solar, we'd love to hear from you.*  
**Specialties:** Alternative Energy, Consultancy, Education, Net Zero Energy, Photovoltaics, Renewables & The Grid, Electrical

## Q

### Qnergy

300 West 12th St.  
Ogden, Utah 84404  
610-390-9360  
mia.ciasulli@qnergy.com  
www.qnergy.com  
*Qnergy strives to be a world leader in thermal energy conversion by providing cutting-edge solutions that extract maximum value-of-energy for our customers while preserving the environment. Qnergy was established in 2009 by Ricor Cryogenic & Vacuum, a world leader in the field of miniature Stirling cryogenic coolers. The Company develops and manufactures highly efficient, reliable and cost-effective Stirling engines for various applications including: micro-combined heat and power (CHP), liquidized natural gas solar power generation and solar CHP. Qnergy's technology will enable residential and business customers to generate power and hot water on-site with a total efficiency of over 90%.*  
**Specialties:** Manufacturing

### Quebec Government Office in Boston

201 Washington St., Ste. 3850  
Boston, Massachusetts 02108  
617-482-1193

qc.boston@mri.gouv.qc.ca  
www.international.gouv.qc.ca/en/boston

Quebec has maintained an office in New England since 1970, recognizing the region's importance as a neighbor and a partner in a wide array of sectors. The Quebec Government Office in Boston's mandate is to defend and promote Quebec's interests throughout the region and to foster economic, political, artistic, academic and institutional exchanges with the six New England states.

**Specialties:** Cities & Communities

## R

### r3construction\_inc.

96 Upham St.  
Melrose, Massachusetts 02176  
781-844-2621

andrew@r3-inc.com  
www.r3-inc.com

r3construction, inc. is a residential builder serving the Greater Boston area. We are a certified Passive House Builder with an in-house CPHC. We are passionate about re-establishing craft into the building process in service of resilient and efficient buildings.

**Professional Specialties:** Building Design & Construction, Envelope & Enclosure, Net Zero Energy, Passive Housing, Remodeling/DER, Single Family, Windows

### R. J. Aley Building Contractor

185 Wilton Rd.  
Westport, Connecticut 06880  
203-226-9933

jaley@rjaley.com  
www.rjaley.com

We specialize in energy efficient home remodeling, green building & historic preservation. Our projects include additions, bathrooms, kitchens and whole house renovations that blend seamlessly with the architectural style & period details of your home while enhancing its energy efficiency, functionality and comfort. We pride ourselves on attention to detail, and re-enforce our commitment to high standards through ongoing education in energy efficiency and sustainable building materials and methods. We strive to establish a relationship with our clients based on trust and integrity. Whether an addition, historic renovation, energy efficiency improvements or new Energy Star home, we maintain the highest standards and see each project through, from inception to completion.

**Specialties:** Alternative Energy, Building Design & Construction, Energy Conservation, Insulation, Remodeling/DER, Single Family

### R. L. Benton - Builder

154 Schoolhouse Rd.  
Center Sandwich, New Hampshire 03227  
603-284-6860

rlbentonbuilder@gmail.com

Full service builder/designer for energy-efficient residential construction in the NH lakes region. Timber-framing as well as advanced hybrid construction, with expertise in solar thermal system design and installation since 1978. Our Sandwich Cabinet Shop can furnish your project as well.

**Specialties:** Building Design & Construction, Energy Conservation, Renewables & The Grid

### Ra Solar Company

PO Box 2222  
Littleton, Massachusetts 01460  
802-496-9496

info@rasolarpower.com  
www.rasolarpower.com

Builders of energy efficient, solar, green homes, additions & renovations since 1978. We can provide complete design/build services to our clients. We also offer green project consulting, plans modification, and specifications writing.

**Specialties:** Alternative Energy, Building Design & Construction, Passive Housing

### Rachel Conly Design, LLC

26 Sterling St.  
Peaks Island, Maine 04108  
207-766-5625

rachel@rachelconlydesign.com  
www.rachelconlydesign.com

We specialize in high performance residential design. Our team is dedicated to improving the health of our global home as we tend to the needs of individual homes. We believe in the interconnectivity of our planet and the sanctuary of a simple, safe and carefully crafted house. Since 2008, we have been practicing in the Northeast, sharing our passion for beauty born in the balance of artistry, efficiency and care.

**Specialties:** Architecture, Design Process, Envelope & Enclosure, Remodeling/DER, Single Family

### RBI Solar, Inc.

5513 Vine St.  
Cincinnati, Ohio 45217  
513-618-7214

info@rbisolar.com  
www.rbisolar.com

RBI Solar, Inc. is the leading turn-key supplier of solar mounting systems. As a specialist in ground mount, roof mount, landfill solar, and custom designed specialty solar structures, RBI Solar focuses on providing the most robust solar racking systems, installation services, and project management capabilities to serve owners and integrators. RBI Solar has engineers on staff licensed in all 50 states and offers complete design, high tech manufacturing, nationwide installation, and technical support to help solve the toughest challenges in the industry. Leveraging more than 80 years of experience in the commercial design-build specialty structures market, RBI Solar works with its clients to identify the most economical, durable and robust solution for solar installations.

**Specialties:** Photovoltaics

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**Specialties:** Alternative Energy, Manufacturing

### Resynergy

9 Rogers St.  
Newton, Massachusetts 02458  
781-801-6480

dfpawling@gmail.com  
www.resynergysystems.com

We're dedicated to improving residential energy efficiency through transparency. Most of us have trouble understanding how much energy we use in our homes—a lack of information makes it difficult for any of us to know. As homeowners and renters, we may understand how much our energy costs each year, but we don't necessarily know how much energy we are actually using or if that energy use is better or worse than other similar homes. We can tell you how efficiently your home is operating by analyzing your home's energy use and benchmarking it to models that take into consideration the age and size of the home, the climate, and the number of people living in the home.

**Specialties:** Energy Auditing, Single Family

### Retrotec, Inc.

1060 East Pole Rd.  
Everson, Washington 98247  
604-732-0142

support@retrotec.com  
www.retrotec.com

Retrotec is the world's leading manufacturer of building diagnostic tools. They make blower doors, duct testers, digital manometers, and air leakage testing software. Retrotec promotes green building through air tightness and enclosure integrity testing with equipment, software & training.

**Specialties:** Certifications & Standards, Consultancy, Energy Auditing, Envelope & Enclosure, Home Inspection, HVAC, Indoor Air Quality, Insulation, Mechanical Systems & Lighting, Multifamily, Passive Housing, Research, Single Family, The Big Picture, Windows

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Salisbury, New Hampshire 03268  
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**Specialties:** Building Design & Construction, Net Zero Energy, Passive Housing, Remodeling/DER

### Richard Renner | Architects

35 Pleasant St.  
Portland, Maine 04101  
207-773-9699

info@rrennerarchitects.com  
www.rrennerarchitects.com

Richard Renner | Architects, a full-service architectural firm with offices in Portland, Maine and Sherborn, Massachusetts, is a richly varied practice creating inspired places for living, working, and learning. Environmentally responsible design is a cornerstone of the practice, and for over a decade, the firm has expanded and refined the process of designing effective "green" buildings.

**Specialties:** Alternative Energy, Architecture, Building Design & Construction, Cities & Communities, Commercial & Institutional, Design Process, Energy Conservation, Indoor Air Quality, Insulation, Multifamily, Net Zero Energy, Remodeling/DER, Single Family, The Big Picture



**Ridgeview Construction**

132A North Rd.  
Deerfield, New Hampshire 03037  
603-303-7206  
scarter@ridgeview-construction.com  
www.greenbuildernh.com

*The home-building industry is more dynamic than ever before. As our environmental consciousness grows, the protection of land and natural resources is a mounting public concern. How we build homes, with regards to location, design and choice of materials, is one of the most significant ways we impact our future. At Ridgeview, we offer a wholistic green approach to home building, harmonizing the intricate systems within the home and property to minimize the environmental impact and improve the overall efficiency and healthiness of a home. Best of all, we care about the bigger picture without comprising aesthetics or the needs of the present. Our award-winning custom design shows that our eye for detail extends through all aspects of the home-building process.*

**Specialties:** Building Design & Construction, Remodeling/DER

**Ridgewood Bushwick Senior Citizens Council (RBSCC)**

555 Bushwick Ave.  
Brooklyn, New York 11206  
718-366-3800  
info@rbicc.org  
www.rbicc.org

*RBSCC was an early adopter of green building and energy efficiency technologies in residential construction. From participating in NYSERDA's first pilot program for multi-family buildings in 2004 to the 2014 completion of the first 100% affordable multi-family passive house in the country, RBSCC has been a leader in the field of green development for over a decade.*

**Specialties:** Multifamily, Passive Housing, Social Services

**Rodman CPAs**

51 Sawyer Rd., Ste. 610  
Waltham, Massachusetts 02453  
617-965-5959  
info@rodmancpa.com  
www.rodmancpa.com

*Rodman CPAs provides tax advisory, accounting, and business strategy services to small and mid-sized emerging and established businesses. The firm combines the innovative and strategic approach associated with large accounting firms with the personal touch of a smaller CPA firm. The firm works with clients across a range of industries, with a particular expertise in the clean energy sector. Rodman's "Green Team" are domain experts in alternative energy, offering tax advisory, financial, and accounting services and Investment Tax Credit (ITC) studies for cleantech companies involved in solar, wind, biomass, and energy efficiency projects.*

**Specialties:** Finance/CPA

**RST Thermal**

372 University Ave.  
Westwood, Massachusetts 02090  
781-320-9910  
mehickey@rstthermal.com  
www.rstthermal.com

*RST Thermal is a Manufacturer's Representatives in the New England area covering Eastern Massachusetts, New Hampshire, Maine, Connecticut, and Rhode Island for multiple leading manufacturers whose products offer a systems approach to comfortable heating and cooling. We provide technical and sales support to our wholesale distributor partners and contractors. For homeowners, we provide geographic lists of installing and servicing contractors to help them find the "best fit" for the project to be done.*

**Specialties:** Multifamily, Single Family, Mechanical Systems & Lighting, HVAC

**S**

**Sage Builders, LLC**

672 Chestnut St.  
Newton, Massachusetts 02468  
617-965-5272  
info@sagebuilders.com  
www.sagebuilders.com

*Award-winning, full service Boston area residential design-build company committed to responsible design and construction practices. Experts in energy efficiency and weatherization.*

**Specialties:** Building Design & Construction, Energy Conservation, Remodeling/DER

**Sandri Energy, LLC**

400 Chapman St.  
Greenfield, Massachusetts 01301  
413-772-2121  
jgoodyear@sandri.com  
www.sandri.com/renewable-energy

*Sandri is a full service energy provider for your home or business. We are family owned company that has been in business for 80 years. Our direct service area encompasses Western MA and Southern VT and NH. We wholesale our products throughout the North East.*

**Specialties:** Biomass, Photovoltaics, Solar Thermal

**SellersLathrop Architects, LLC**

1 Kings Hwy. North  
Westport, Connecticut 06880  
203-222-0229  
info@sellerslathrop.com  
www.sla-arch.com

*A small, woman-owned firm designing upgrades, additions and renovations for 21st century living. Primary projects are residential and light commercial work in Fairfield County, CT., emphasizing energy efficiency and smart building technologies to create high quality solutions with character and style.*

**Specialties:** Building Design & Construction

**Shoreline Builders, Inc.**

364 CJ Cushing Hwy.  
Scituate, Massachusetts 02066  
781-544-3360  
info@shorelinebuilders.net  
www.shorelinebuilders.net

*Shoreline Builders, Inc., is a full service residential construction company serving Boston's South Shore. Led by builder Jim Wolffer, we specialize in custom homes, additions and renovations featuring fine architectural finishes. We offer full design services or work with your architectural plans.*

**Specialties:** Building Design & Construction, Construction Process, Design Process, Remodeling/DER, Single Family

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www.sjpconsulting.biz

*Offering Pioneer Valley, MA, residents an unbiased, friendly perspective on energy saving and renewable energy options for their homes, helping them: explore & prioritize cost-effective measures for a cozier, healthier home with less wasted energy, understand renewable energy options like solar, tap incentives, and learn about financing for energy projects. I also provide clients with a list of vetted local energy contractors. For businesses & nonprofits, my services include: writing articles, press releases, grant proposals, and website text; managing and promoting projects; collaborating with organizations; and public education.*

**Specialties:** Alternative Energy, Composting, Consumer Information, Education, Energy Conservation, Single Family

**Smart Energy of New England, Inc.**

PO Box 56  
Colebrook, New Hampshire 03576  
800-608-5840

info@smartenergyne.com  
www.smartenergyne.com

*Smart Energy of New England is a seven-year-old corporation located in Columbia, New Hampshire. We serve New Hampshire, Vermont and Maine as well as the Bahamas. We are an up-and-coming provider of energy efficient systems, both commercial and residential. Our main focus is on Solar Photovoltaic Systems and we are becoming well-known for our attention to detail and our satisfied-customer business model. We are currently increasing our presence in the international marketplace with new projects in the Bahamas and potential projects in Africa. Our mission is to introduce our customers to local natural resources to save them money while reducing our collective carbon footprint and decreasing our dependence on fossil fuels and imports.*

**Specialties:** Biomass, Photovoltaics, Solar Thermal, Wind

**SolaBlock**

116 Pleasant St., EastWorks 254  
Easthampton, Massachusetts 01027  
339-230-4600

pquinlan@solablock.com  
www.solablock.com

*SolaBlock LLC manufactures permanently PV-clad building materials, providing a cost-competitive solar solution to meet most of the electric load in a energy-efficient building.*

**Specialties:** Alternative Energy, Architecture, Building Design & Construction, Certifications & Standards, Cities & Communities, Commercial & Institutional, Construction Process, Design Process, Engineering, Envelope & Enclosure, Manufacturing, Multifamily, Net Zero Energy, Passive Housing, Photovoltaics, Renewables & The Grid, Research, Electrical

**Solar Store of Greenfield**

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Greenfield, Massachusetts 01301  
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claire@solarstoreofgreenfield.com  
www.solarstoreofgreenfield.com

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**Specialties:** Energy Conservation, Photovoltaics, Solar Thermal

**Solar Wave Energy, Inc.**

31 Cambridge Ter.  
Cambridge, Massachusetts 02140  
617-242-2150

info@solarwave.com  
www.solarwave.com

*Solar Wave Energy has been installing and servicing solar energy systems since 1978. Today we provide controller integrated web-based monitoring for solar thermal (heating & hot water) systems allowing installers and building owners to oversee and manage their systems remotely. We currently have integrated performance monitoring for solar controllers including Resol, Caleffi, Stiebel Eltron, Viessmann and more. Call or see demo at www.solarwave.com.*

**Specialties:** Energy Auditing, Energy Conservation, Solar Thermal

**Solect Energy Development**

89 Hayden Rowe St., Ste. E  
Hopkinton, Massachusetts 01748  
508-598-3511

info@solect.com  
www.solect.com

*Solect, Inc. is a solar renewable energy development company focused on the deployment of solar photovoltaic (PV) systems. Solect works with the appropriate financial partners to fund the deployment of solar renewable energy systems.*

**Specialties:** Photovoltaics

**SOTA Construction Services, Inc.**

80 Union Ave.  
Pittsburgh, Pennsylvania 15202  
412-766-4630

esota@sotaconstruction.com  
www.sotaconstruction.com

*We are a leading regional provider of sophisticated, cost-effective Total Quality Construction Services™. We take pride in our commitment to client satisfaction, personal attention, open communication, continuous process improvement, dedication to sustainability and value engineering. We are proud of the solutions we've delivered for our clients. Our client list includes medical, institutional, light industrial and multi-family residential developers—both for-profit and not-for-profit owners.*

**Specialties:** Commercial & Institutional, Construction Process, Multifamily

**South Mountain Company**

15 Red Arrow Rd.  
West Tisbury, Massachusetts 02575  
508-693-4850

info@southmountain.com  
www.southmountain.com

*South Mountain Company, located on Martha's Vineyard, is a multi-faceted firm offering architecture, engineering, building, interiors, woodworking, and energy services.*

**Specialties:** Building Design & Construction, Energy Conservation, Photovoltaics

**Sparhawk Group**

81 Bridge St., Ste. 107  
Yarmouth, Maine 04096  
207-846-7726

admin@sparhawkgroup.com  
www.sparhawkgroup.com

*From offices in New York City and Portland, Maine, we have driven energy efficiency into over 25,000 units of multifamily buildings, commissioned \$900+ million in new construction and provided leadership in energy efficiency since 1990. Early in the company's history, Sparhawk Group began with pay-for-performance energy efficiency projects delivering 3.5 megawatts of electrical power conservation at industrial, institutional, commercial and government buildings. These projects were commissioned to ensure savings, and thus payments for performance, were realized. This grounding in energy performance and commissioning drives our company vision to this day.*

**Specialties:** Consultancy, Design Process, Energy Auditing, Engineering, Multifamily

**Spartan Solar**

10 Charles St.  
Greenfield, Massachusetts 01301  
413-768-0095

gospartansolar@gmail.com  
www.gospartansolar.com

*Spartan Solar is a full service solar hot water provider based in Greenfield, Massachusetts. Solar hot water is the solar that comes with a battery.*

**Specialties:** Alternative Energy, Building Design & Construction, Consultancy, Energy Conservation, HVAC, Net Zero Energy, Renewables & The Grid, Solar Thermal

**SPL Development Group**

71 Deer Hill Cir.  
Pelham, New Hampshire 03076  
603-582-0151

spaquette@splllc.com

*Steve has over 28 years experience in real estate development, construction and property management. After earning a bachelor's degree in management in 1984, he began working in real estate development, acquiring development sites. He has been a registered Massachusetts Real Estate Broker since 1987. In 1988, Steve began developing multi-family apartment sites for SK Properties. During that time, he developed over 600 units of elderly and family properties in three New England States. He also developed and managed the build out of several single-family subdivisions, the latter of which was a 43-unit development in the southern part of Manchester, NH, Heritage Common, completed in 1997.*

**Specialties:** Building Design & Construction

**Steele Kellogg AIA**

3 Walnut St.  
Madison, New Jersey 07940  
973-377-5757

steelekellogg@gmail.com  
www.steelekellogg.com

*We draw on an interdisciplinary team of design professionals to give you the highest level of expertise, concentrating on a small number of clients in order to bring each project the attention it deserves. Whether you are planning a new building, a renovation or an addition, for an imaginative and thoughtful review of your design needs, please contact us.*

**Specialties:** Architecture, Design Process

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*Stephen Turner, Inc. is dedicated to providing comprehensive commissioning services. Commissioning is a quality process which ensures, verifies, and documents that a completed project or existing building meets the owner's needs and expectations. Our firm provides commissioning services in all forms - new building commissioning, renovation commissioning, retro commissioning, ongoing commissioning of existing buildings, and commissioning of system retrofits.*

**Specialties:** Construction Process

### Steven Winter Associates, Inc.

3077th Ave., Ste. 1701  
New York, New York 10001  
203-857-0200  
[tesperance@swinter.com](mailto:tesperance@swinter.com)  
[www.swinter.com](http://www.swinter.com)  
*Steven Winter Associates, Inc. provides research, consulting and advisory services to improve commercial, residential and multifamily built environments for private and public sector clients. We specialize in energy, sustainability and accessibility consulting as well as certification, research & development and compliance services. Our engineers and architects have led the way since 1972 in the development of best practices to achieve high performance buildings. As a matter of course, we collaborate with our clients to produce the most cost-effective and innovative solutions.*

**Specialties:** Alternative Energy, Architecture, Building Design & Construction, Certifications & Standards, Cities & Communities, Commercial & Institutional, Consultancy, Education, Energy Auditing, Energy Conservation, Engineering, Envelope & Enclosure, HVAC, Indoor Air Quality, Insulation, Marketing, Multifamily, Net Zero Energy, Passive Housing, Photovoltaics, Renewables & The Grid, Research, Single Family, HERS Rater

### Steveworks, LLC

108 Cabot St.  
Newton, Massachusetts 02458  
617-201-0121  
[info@steveworks.com](mailto:info@steveworks.com)  
[www.steveworks.com](http://www.steveworks.com)  
*At Steveworks, we expect all our jobs to exemplify craftsmanship, durability, and value. These principles are important to the customers who frequently come back to us or pass us along to new clients, and they are the pillars of sustainable building. Being sustainable requires us to take into account energy performance, the sources and quantity of materials and resources, and how often those materials or other parts of your home will last. We believe quality craftsmanship, durability, value, and sustainability can all be implemented with a practical approach that will fit in any budget.*

**Specialties:** Remodeling/DER

### Stiebel Eltron, Inc.

17 West St.  
West Hatfield, Massachusetts 01088  
413-247-3380  
[bill.riley@stiebel-eltron-usa.com](mailto:bill.riley@stiebel-eltron-usa.com)  
[www.stiebel-eltron-usa.com](http://www.stiebel-eltron-usa.com)  
*Stiebel Eltron - German manufacturer energy saving Tempra Plus tankless electric (99% efficient) water heaters feature advanced flow control to automatically keep output temperature constant and provide unlimited hot water. Accelera 220E (58gal) & 300E (80gal) Heat Pump water heaters with electronic anodes, Energy Star rated with energy factors 220E (3.05EF), 300E (3.39EF), just 650W in HP mode & max 2150W incl back-up element, annual energy use 220E (1040 kWh/yr) 300E (1289 kWh/yr) as determined by DOE testing. Stiebel solar thermal systems present a great hedge against fossil fuel price volatility. Federal tax credits, often state and local incentives too, can cut installed cost by up to 40%.*

**Specialties:** Alternative Energy, Energy Conservation, Manufacturing, Renewables & The Grid, Solar Thermal

### Stonehenge Associates

27 Cohoes Rd.  
Watervliet, New York 12189  
518-874-1604  
[info@stonehenge-associates.com](mailto:info@stonehenge-associates.com)  
[www.stonehenge-associates.com](http://www.stonehenge-associates.com)  
*Stonehenge Associates has 3 major components to our business platform. Home Performance/Energy Reduction: as an Energy Star® partner, HERS Rater, LEED for Homes Green Rater & NYSERDA contractor, we incorporate the "house as system" concept, providing the latest technology & methods to analyze, & determine expected savings and ratings; as well as identifying any potential incentives, low interest rates or subsidies. Design & Consulting: energy efficient design for commercial & residential projects incorporating the latest techniques including energy savings, environmental benefits & improved indoor air quality and health. Commercial Audits: ASHRAE Levels I, II, & III; EPA Energy Star® Commercial Certification using the EPA Energy Star® Portfolio Manager (Benchmarking).*

**Specialties:** Alternative Energy, Building Design & Construction, Commercial & Institutional, Consultancy, Design Process, Education, Energy Auditing, Energy Conservation, Indoor Air Quality, Insulation, Mechanical Systems & Lighting, Multifamily, Net Zero Energy, Photovoltaics, Single Family, HERS Rater

### SunBug Solar

1165 Mass Ave., Ste. 201  
Arlington, Massachusetts 02476  
617-500-3938  
[info@sunbugssolar.com](mailto:info@sunbugssolar.com)  
[www.sunbugssolar.com](http://www.sunbugssolar.com)  
*Founded in 2009, SunBug Solar has designed and installed over 800 solar systems all across Massachusetts, ranging in size from 1kW to over 500kW. We deliver the highest-quality solar solutions in conjunction with the best possible customer experience. Our integrated approach—from initial education through consultative design to quality installation and ongoing support—has earned SunBug the highest reputation for customer service, and a host of satisfied residential and commercial customers.*

**Specialties:** Alternative Energy, Commercial & Institutional, Multifamily, Photovoltaics, Single Family, Solar Thermal



### SunCommon NY

318 Timothy Ln.  
Ontario, New York 14519  
585-265-2384  
<http://suncommon.com/ny>

*We are SunCommon, Rochester, Central and Western New York's Largest Solar Provider. With residential, commercial, and the Rochester region's first ever community solar option, we're powering thousands with clean solar energy. SunCommon believes that everyone has the right to a healthy environment and brighter future - and renewable energy is where it starts. Energy from the sun can power our lives and build vibrant communities. Our mission is to tear down barriers to clean energy and use our business as a force for good.*

**Specialties:** Alternative Energy, Commercial & Institutional, Multifamily, Photovoltaics, Single Family

### Sustainable Comfort, Inc.

146 Main St., Ste. 301  
Worcester, Massachusetts 01608  
508-713-6680  
[info@greenater.com](mailto:info@greenater.com)  
[www.greenater.com](http://www.greenater.com)

*Sustainable Comfort, Inc. (SCI) is a green building and energy efficiency consulting firm with expertise in multifamily housing. SCI specializes in ENERGY Star Homes, LEED for Homes, Enterprise Green Communities, Passive House, HERS Rating, State Incentive Programs, and Code Compliance. We are also involved with the property management and development of multifamily buildings. SCI is proficient in the affordable multifamily development process and helps you secure funding and project certifications. We help make it easy to navigate the many options to meet your green building and energy efficiency needs. Our team has over 20 years combined experience in the energy efficiency and green building consulting industry. We have certified over 3,000 units for various programs and certifications.*

**Specialties:** Certifications & Standards, Consultancy, Multifamily, Passive Housing

### Sustainable Energy Analytics

4 Militia Dr., Ste. 6  
Lexington, Massachusetts 02421  
781-652-8282  
[energystar@sea.us.com](mailto:energystar@sea.us.com)  
[www.sea.us.com](http://www.sea.us.com)

*Sustainable Energy Analytics, LLC is dedicated to helping owners of all types of residential buildings (from single family to large multi-family, new and existing) maximize the value of their property by: Reducing the energy consumption, improving the building's durability and comfort, providing a safe and healthy environment for the occupants, and identifying the most economical path, unbiased by product or technology loyalties.*

**Specialties:** Building Design & Construction, Construction Process, Consultancy, Energy Conservation, Envelope & Enclosure, Insulation, Renewables & The Grid, Single Family, HERS Rater

### SWZ Architects, LLC

1 Edgehill Rd.  
Winchester, Massachusetts 01890  
617-890-8907  
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*The Green Engineer, Inc. is a sustainable design consulting firm specializing in solutions to design, build, and operate buildings with improved energy efficiency and reduced impact on the environment. Founded in 2005 by Chris Schaffner, PE, LEED Fellow, the firm has a technical staff of fifteen LEED-Accredited Professionals. The expert team brings to the table experience and perspective from a variety of backgrounds including engineering, architecture, construction, planning, development, and public policy.*

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*Mr. MacLean is an Architect, Educator and licensed Builder who began his career as a Project Manager with a number of large Architectural firms in Boston before he started his own firm, Timeless Architecture in 1988. He has been promoting and teaching Green Design for 25 years, starting with the Boston Society of Architects, where he served as co-chair of the Committee on the Environment (COTE), a sub-committee of the BSA that promotes sustainable design in the New England Region. He has taught and developed ongoing curricula at the Boston Architectural College, Sustainable Design Institute and Master's program.*

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*The United Illuminating Company (UI), Southern Connecticut Gas Company (SCG) and the Connecticut Natural Gas Company (CNG) are administrators of the Residential and Commercial Industrial energy efficiency programs through the Energize Connecticut initiative. Energize Connecticut (SM) is an initiative dedicated to empowering Connecticut citizens to make smart energy choices, now and in the future. We provide Connecticut consumers, businesses and communities the resources and information they need to make it easy to save energy and build a clean energy future for everyone in the state. Energize Connecticut helps you save money and use clean energy.*

**Specialties:** Building Design & Construction, Energy Auditing, Energy Conservation

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## V

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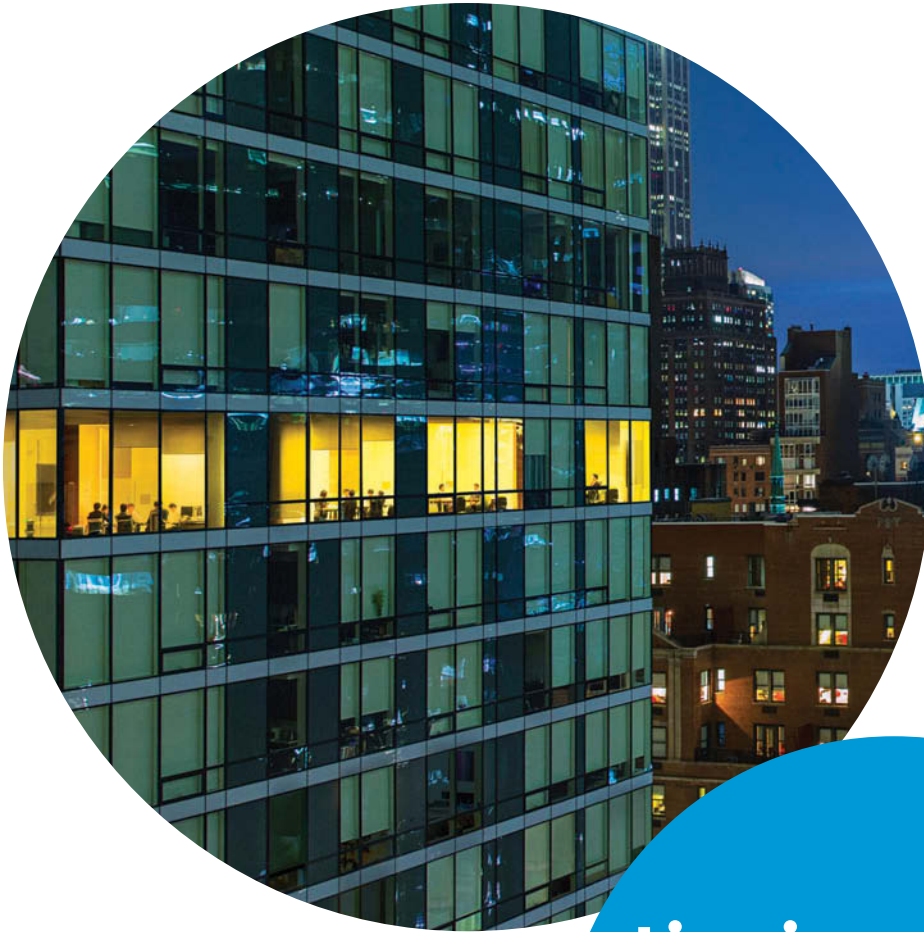


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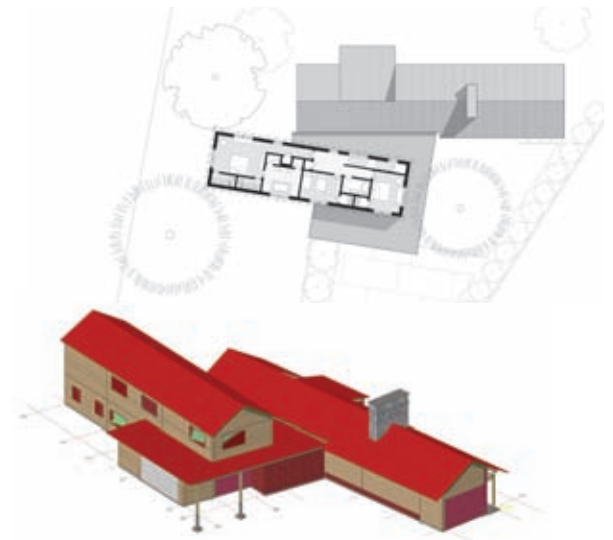




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